Service Manual

GSM Mobile Telephone

Transceiver Unit
EB-2803
Handset Unit
EB-1142
Handsfree Cradle Unit
EB-J03467
Transportable Unit
EB-J03468

Panasonic
GSM

Panasonic

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NATIONAL ACCREDITATION OF CERTIFICATION BODIES

MCUK-TSD-001 SM Iss 1 Rev 0

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Amendment Record

The information provided in this Service Manual is issued at November 1991. Amendments to this manual will be promulgated by the issue of an Amendment Instruction Sheet, together with amended sheets for insertion into the manual. Carry out the amendment instructions and enter the appropriate details in the Amendment Record below.

Amendment No.	Amended By	Date

WARNUNGEN UND VORSICHTSMASSNAHMEN

WARNING

Die in diesem Handbuch beschriebene Ausrüstung enthält polarisierte Kondensatoren , die flüssiges Electrolyt verwenden. Diese Teile sind vollkommen sicher, vorausgesetzt, es kommt weder zu einem Kurzschluß noch zu einem Anschluß mit entgegengesetzter Polarität an einem der Kondensatoranschlüsse. NICHTBEACHTUNG DIESER WARNUNG KÖNNTE ZU SCHÄDEN AN DER AUSRÜSTUNG FÜHREN ODER, SCHLIMMSTENFALLS, PERSONEN DURCH EINEN ELEKTROSCHOCK ODER DURCH EXPLOSION EINES BESCHÄDIGTEN KONDENSATORS VERLETZEN, WENN MIT DIESEN GERÄTEN UMGEGANGEN WIRD.

Vorsicht

Die in diesem Handbuch beschriebene Ausrüstung enthält elektrostatisch empfindliche Vorrichtungen (ESDs). Diese Vorrichtungen können beschädigt werden, wenn die entsprechenden Arbeitsanweisungen nicht beachtet werden.

PREFACE

Throughout the European countries there are many mobile telephone systems currently in operation. The standards used from one operator to another are very diverse, therefore system compatibility does not exist. The various systems employed by the European countries all use analogue radio links between mobiles and base stations. The frequency allocation also changes relevant to the system used.

To overcome these problems a new mobile standard was set up. The main objective of the new standard was to provide Pan-European compatibility, as well as introduce new techniques to enable greater capacity and call reliability over the analogue systems. This new system was given the name GSM: Global System for Mobile communications.

Refer to Appendix A for more details on GSM design philosophy, and projected system growth.

TECHNICAL SPECIFICATION

1. TRANSCEIVER

1.1 RATINGS

(1) Frequency
Transmitter : 890-915 MHz
Receiver : 935-960 MHz

(2) Transmit/Receive frequency separation : 45 MHz

(3) RF channel bandwidth : 200 kHz (including 8 TDMA user channels.)

(4) Number of RF channels : 124

(5) Number of User channels : 992 (124 x 8)

(6) Antenna Terminal impedance : 50 Ω

(7) RF output power : 8 W (Max)

(8) Power source : 13.2 V DC
(10.8 V to 15.6 V negative ground)

(9) Power consumption
Transmit : 2000 mA (max) at +13.2 V DC
Standby : 100 mA (max) at +13.2 V DC

(10) Operating temperature Range : -10°C to +55°C

(11) Dimensions (W x H x D)
Handset : 62 x 199 x 32.4 mm
Transceiver : 145.6 x 215 x 23.5 mm
Cradle : 66.5 x 137 x 46 mm
Transportable : 170 x 214 x 43 mm

(12) Weight
Handset : 330 g
Transceiver : 850 g
Cradle : 190 g
Transportable : 460 g

1.2 PERFORMANCE CHARACTERISTICS

1.2.1 Transmitter

(1) Frequency Range : 890 to 915 MHz

(2) Frequency Hopping : Hopping switching time : 1 ms max (217 hops/sec)

(3) Frequency Error : ± 0.1 ppm max, relative to base station frequency

(4) Modulation Phase Error

RMS Value : 5° max
Absolute Value : 20° max

(5) Spurious Emissions at Antenna Connector (max)

Tx Operating Mode
: 4 pW (-76 dBm) @ 935 kHz to 960 kHz
: 0.25 μW (-36 dBm) @ 9 kHz to 1 GHz
: 1 μW (-30 dBm) @ 1 GHz to 12.75 GHz

Idle Mode
: 4 pW (-84 dBm) @ 935 kHz to 960 kHz
: 2 nW (-57 dBm) @ 9 kHz to 1 GHz
: 20 nW (-47 dBm) @ 1 GHz to 12.75 GHz

(6) RF Output Spectrum

(a) Spectrum due to Modulation

POWER LEVEL	Maximum level relative to the carrier (dBc), at the listed frequencies from the carrier (kHz), in a 30 kHz Bandwidth				
dBm	100 kHz	200 kHz	250 kHz	400 kHz	600 kHz
39	+ 0.5	-30	-33	-60	-66
37	+ 0.5	-30	-33	-60	-64
35	+ 0.5	-30	-33	-60	-62
≤ 33	+ 0.5	-30	-33	-60	-60

(b) Spectrum due to Switching Transients

POWER LEVEL	Maximum Level for various offsets from carrier frequency.			
dBm	400 kHz	600 kHz	1200 kHz	1800 kHz
39	-21	-26	-32	-36
≤ 37	-23	-26	-32	-36

(7) Transmitter Carrier Peak Power

POWER CONTROL LEVEL	PEAK POWER	TOLERANCE	
	(dB)	NOMINAL (dB)	MAXIMUM (dB)
2	39	± 2	± 2.5
3	37	± 3	± 4
4	35	± 3	± 4
5	33	± 3	± 4
6	31	± 3	± 4
7	29	± 3	± 4
8	27	± 3	± 4
9	25	± 3	± 4
10	23	± 3	± 4
11	21	± 3	± 4
12	19	± 3	± 4
13	17	± 3	± 4
14	15	± 3	± 4
15	13	± 3	± 4

1.2.2 **Receiver**

(1) Bad Frame Indication (BFI) Performance : 82000 Frame Samples

: 200 max Frame Errors (under DTX conditions)

(2) Reference Sensitivity level
(requirements are satisfied with input signal of -104 dBm)

TYPE OF CHANNEL	PROPAGATION CONDITIONS				
	STATIC	TU5O (no FH)	TU5O (Ideal FH)	RA250 (no FH)	HT 100 (no FH)
SDCCH (FER)	0.1%	10%	4%	8%*	9%**
RACH (FER)	0.5%	13%	13%	12%	13%
SCH (FER)	1%	16%	16%	15%	16%
TCH/F9.60 and H4.8 (BER)	10^{-5}	0.5%	0.4%	0.1%	0.7%
TCH/F4.8 (BER)	-	10^{-4}	10^{-4}	10^{-4}	10^{-4}
TCH/F2.4 (BER)	-	2×10^{-4}	10^{-5}	10^{-5}	10^{-5}
TCH/H2.4 (BER)	-	2×10^{-4}	10^{-4}	10^{-4}	10^{-4}
TCH/F5 (FER)	$0.1\propto\%$	$6\propto\%$	$3\propto\%$	$2\propto\%$	$7\propto\%$
CLASS Ib (RBER)	$0.4/\propto\%$	$0.4/\propto\%$	$0.3/\propto\%$	$0.2/\propto\%$	$0.5/\propto\%$
CLASS II (RBER)	2%	8%	8%	7%	9%

Notes

1. * Under Ideal FH (RA 250), the SDCCH FER performance should be better than 4%.

2. ** Under Ideal FH (HT 100), the SDCCH FER performance should be better than 6%.

3. $1 \leq \propto \leq 1.6$ depends on channel condition.

(3) Usable Receiver Input Level Range

Upto - 10 dBm (Static Characteristic)
Upto - 40 dBm (Multi-path phasing)

Channels	Max Events	Max Samples
Static	200	1640000
EQ50	3900	120000

2. TRANSPORTABLE

2.1 RATINGS

(1)	Charge Current	: 160 mA (1.2 AH Battery) : 240 mA (1.8 AH Battery)
(2)	Charge Time	: 10 hours
(3)	Operating Voltage	: 10.8 V to 16.5 V
(4)	Power Consumption	
	Transmit	: 2000 mA (max) at 13.2 V DC
	Standby	: 200 mA (max) at 13.2 V DC
(5)	Weight (including Handset, Transceiver and Battery)	
	1.2 AH battery	: 2000 g
	1.8 AH battery	: 2220 g

2.2 ELECTRICAL CHARACTERISTICS

(1)	Maximum Input Voltage	: 30 V DC
(2)	Temperature Range	
	Storage	: -35°C to +85°C
	Operating	: -10°C to +40°C
(3)	Operating Voltage range	: 10.8 V to 16.5 V DC
(4)	Charge Time	: 10 ± 2.5 hrs (-20°C +60°C)
(5)	Charge Current	
	25°C	: 180 mA ± 16 mA (1.2 AH Battery) : 240 mA ± 16 mA (1.8 AH Battery)
	-10°C	: ≤ 120 mA (1.2 AH Battery) : ≤ 170 mA (1.8 AH Battery)
(6)	Charge Voltage Range at Terminals	: 0V to Maximum Safe Output Voltage (see 8 below)
(7)	Maximum Operating Input Voltage	: 19.0 ± 1.5 V DC
(8)	Maximum Safe Output Voltage	: 18.0 ± 1.5 V DC
(9)	Circuit Current	
	Operating	: 500 mA max
	Ext. Control Low	: 60 mA max
	Charge Time Off	: 3 mA max.

2.3 OPERATING CHARACTERISTICS

(1) Charger Starting Conditions

Transceiver connected to Power Supply (Car Battery) : Internal Battery Charger will start when Transportable battery is installed into Transportable Case Unit

Transportable battery is installed into Transportable Case Unit : Internal Battery Charger will start when Transceiver is connected to Power Supply (Car Battery).

(2) Charger Stopping Conditions

: (a) Charge time has finished.
: (b) External Control terminal is low (0V).
: (c) Transceiver disconnected from Power Supply (Car Battery).
: (d) Power supply voltage is greater than maximum operating input voltage.
: (e) Battery charge terminal voltage is greater than the specified maximum safe output voltage.

1. INTRODUCTION

1.1 PURPOSE OF THIS MANUAL

This manual contains the information and procedures required for installing, operating and servicing the Panasonic GSM B-Model Digital Cellular Mobile Telephone system operating on the GSM Pan-European Digital Cellular Network.

1.2 STRUCTURE OF THE MANUAL

The manual is structured to provide service engineering personnel with the following information and procedures:

(1) General and technical information - provides a basic understanding of the equipment, kits and options, together with detailed information for each of the major component parts.

(2) Installation and operating information - provides instructions for unpacking, installing and operating the equipment.

(3) Servicing information - provides complete instructions for the testing, disassembly, repair and reassembly of each major component part. Step-by-step troubleshooting information is given to enable the isolation and identification of a malfunction, and thus determine what corrective action should be taken. The test information enables verification of the integrity of the equipment after any remedial action has been carried out.

(4) Illustrated parts list - provided to enable the identification of all equipment components, for the ordering of spares/replacement parts.

1.3 SERVICING RESPONSIBILITIES

The procedures described in this manual must be performed by qualified service engineering personnel, at an authorised service centre.

The service engineering personnel are responsible for fault diagnosis and repair of all equipment described in this manual.

2. GENERAL DESCRIPTION

2.1 INTRODUCTION

This chapter provides a general description of the GSM Mobile Telephone system. An introduction to each of the major system components is given, together with a brief description of the principles of operation employed by the system.

Also provided in this chapter are details about the basic, and optional, kit compositions.

2.2 EQUIPMENT DESCRIPTION

The GSM Mobile Telephone system comprises the following major components:

(1) Transceiver Unit, EB-2803.

(2) Handset Unit, EB-1142.

(3) Handsfree Cradle Unit, EB-J03467.

(4) Transportable Case Unit, EB-J03468.

General assembly diagrams for each component are provided at Figures 2.2 to 2.6.

2.2.1 TRANSCEIVER UNIT

The Transceiver Unit, shown at Figure 2.2, provides the system's transmit/receive and associated control functions. The unit can be either car mounted (using a Transceiver Mounting Tray, Figure 2.3) or transportable (using the Transportable Case Unit, Figure 2.6): refer to Basic/Optional Kit Compositions for further details.

2.2.2 HANDSET UNIT

The Handset Unit, shown at Figure 2.4, connects to the Transceiver Unit to complete the basic telephone system. The Handset Unit is normally stowed in the Handsfree Cradle Unit (car mounted applications) or in the Transportable Case Unit (transportable applications).

2.2.3 HANDSFREE CRADLE UNIT

The Handsfree Cradle Unit, shown at Figure 2.5, consists of a car mounted cradle (for stowage of the Handset Unit) and car mounted microphone. The unit enables total handsfree operation.

2.2.4 TRANSPORTABLE CASE UNIT

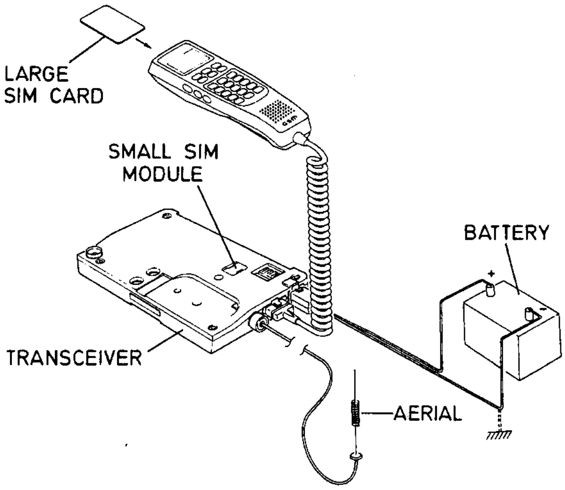
The Transportable Case Unit, shown at Figure 2.6, enables the telephone system to be used in a transportable application. The Transceiver Unit and Handset Unit are both fitted to the Transportable Case Unit, with power being supplied from a rechargable battery pack. Battery charging circuits are incorporated within the Transportable Case Unit.

2.3 PRINCIPLES OF OPERATION

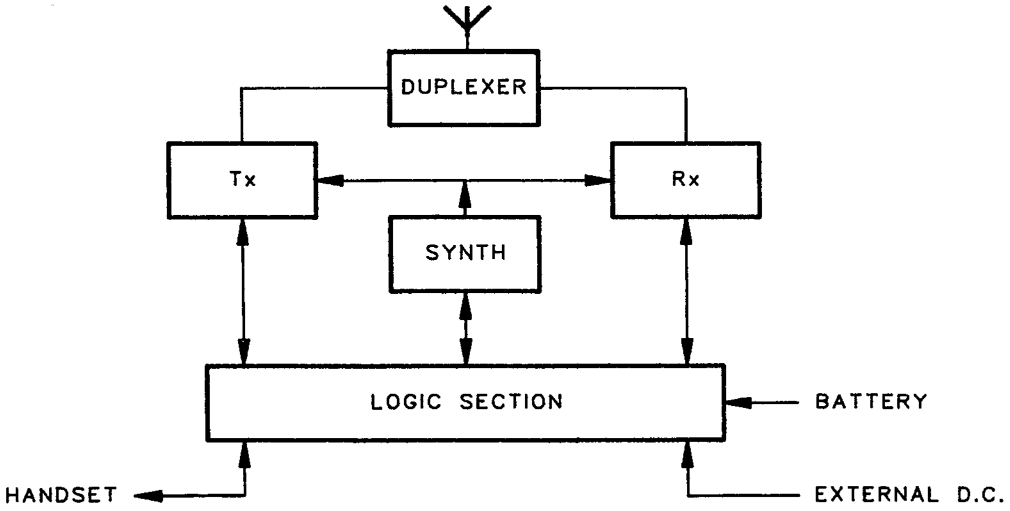
2.3.1 SYSTEM OVERVIEW

The GSM Mobile Telephone system is designed to operate on the GSM Pan-European Digital Cellular Network. The mobile telephone is operated in conjunction with a SIM (Subscriber Identification Module) card. The SIM card holds all the personal details of the owner for system access and billing.

The GSM Transceiver Unit is of similar modular structure to previous cellular mobiles. The major differences between the GSM Transceiver Unit and previous mobiles are in the complexity of each section, the internal system architecture, and the operational techniques used to achieve digital communication. Refer to Figure 2.1(a) and (b) for modular diagrams of the basic system.



(a) Basic System Diagram



(b) Functional Block Diagram

Figure 2.1 Basic GSM Mobile Telephone System

2.3.2 TRANSMISSION

The Transceiver uses GMSK (Gaussian Minimum Shift Keying) to provide digital transmission at 270 kbits/s over the transmit band of 890 MHz to 915 MHz. The duplex separation is 45 MHz giving a receive band of 935 MHz to 960 MHz. The channel bandwidth is 200 kHz, providing 124 RF channels, each of which is further divided using TDMA (Time Division Multiple Access) into 8 time slots.

2.3.3 SIM CARD/MODULE

A GSM Mobile Telephone will only operate when a SIM (Subscriber Identification Module) card is plugged into the Handset Unit or a SIM module is fitted into the Transceiver Unit. The SIM module offers the option to store the User's personal details permanently within the mobile. Access to the SIM module can be obtained by removal of a plastic cover on the Transceiver Unit casing. (SIM module dimensions are 25 mm x 15 mm.) Refer to Figure 2.1(a) for Basic System Diagram.

The Transceiver CPU utilises all the User information programmed in the SIM, ie lock code, mobile telephone number, memory re-dial and various levels and settings. Use of a SIM enables operation of the mobile, therefore selection of the lock function will limit access to certain Users.

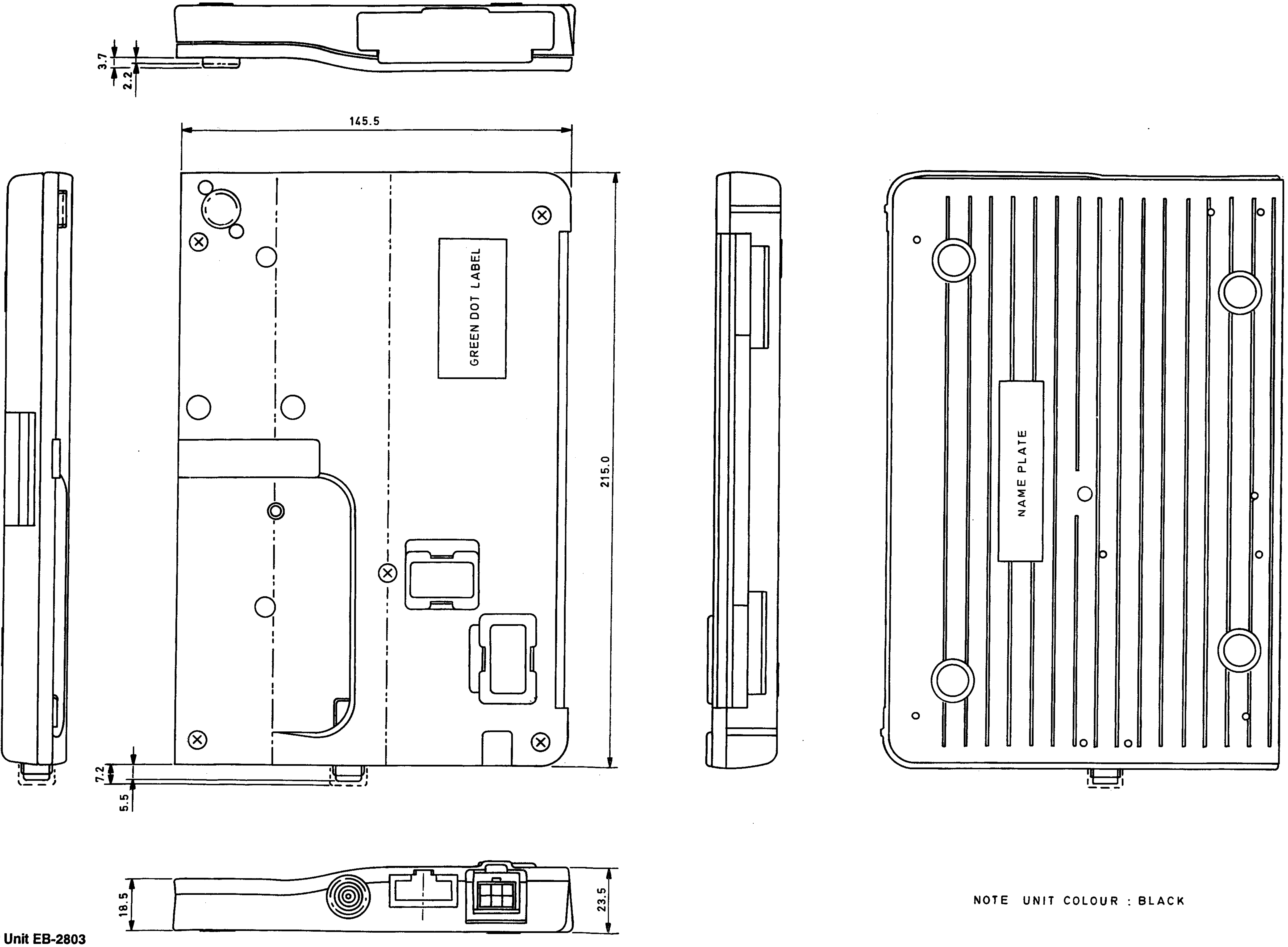
The SIM card (about the size of a credit card) can be used in any GSM mobile to provide the option of lending telephones. The Handset is designed to accept the SIM card via a slot on its top edge. When the card is inserted, the Transceiver down loads all the new User data and operates accordingly. The use of the SIM card overrides the information provided by the SIM module and so all charges are recorded against the SIM card.

2.3.4 OPERATION WITH A SIM CARD/MODULE

Once fitted with a valid SIM, the mobile telephone will operate in a similar way to existing cellular mobiles. For a full description refer to the Operator's Guide provided at Chapter 5.

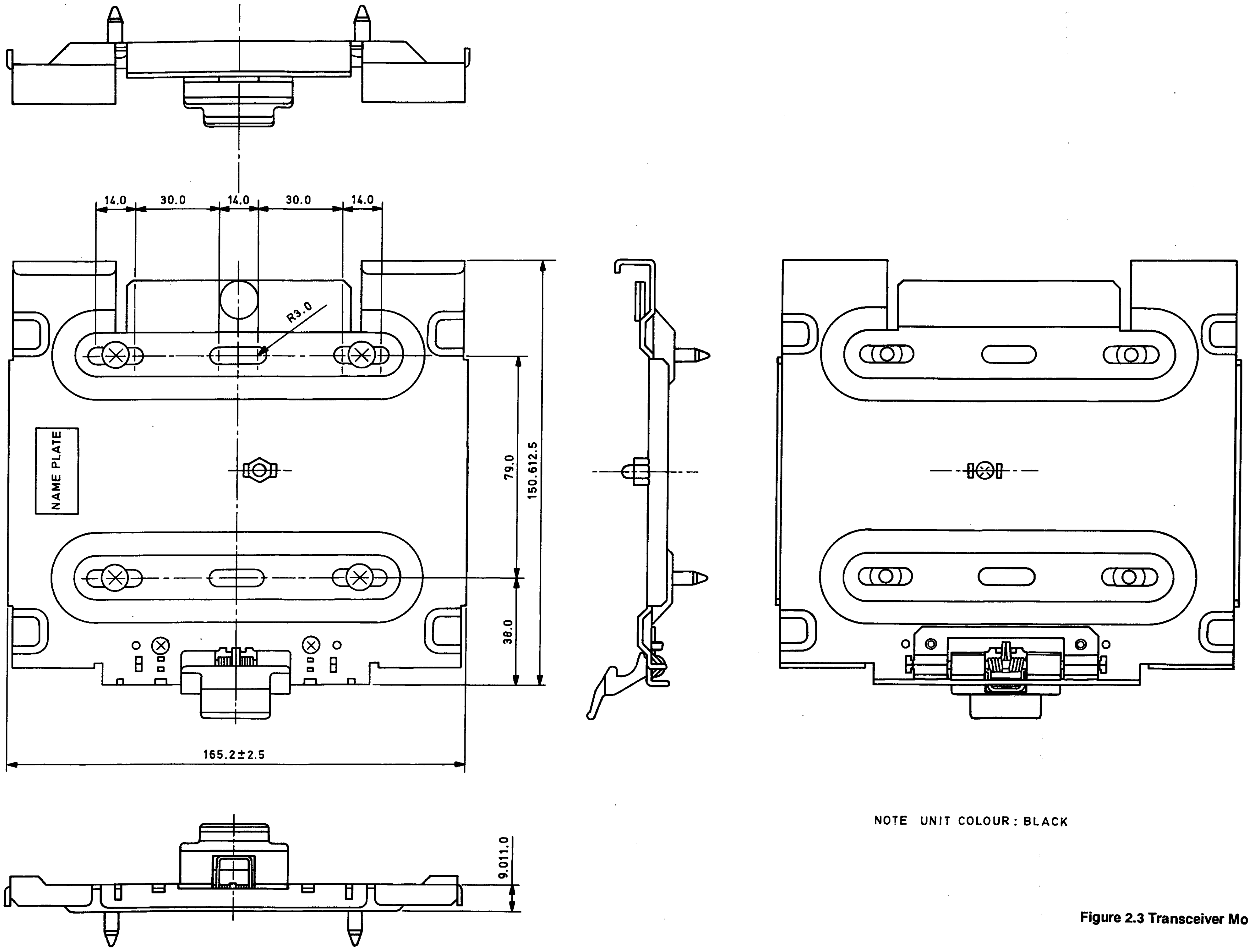
2.4 BASIC/OPTIONAL KIT COMPOSITIONS

The GSM Mobile Telephone is supplied as a basic kit, comprising a Transceiver Unit and a Handset Unit, together with a Car Mount kit and/or a Transportable Unit kit, depending upon the particular application. Details of the basic/optional kit compositions are provided at Figures 2.7 to 2.9.


3.7
2.2
145.5
GREEN DOT LABEL
215.0
NAME PLATE
7.2
5.5
18.5
23.5

NOTE UNIT COLOUR : BLACK

Figure 2.2 Transceiver Unit EB-2803


14.0
30.0
14.0
30.0
14.0
R3.0
NAME PLATE
79.0
150.612.5
38.0
165.2±2.5
9.011.0

NOTE UNIT COLOUR : BLACK

Figure 2.3 Transceiver Mounting Tray EB-N01226

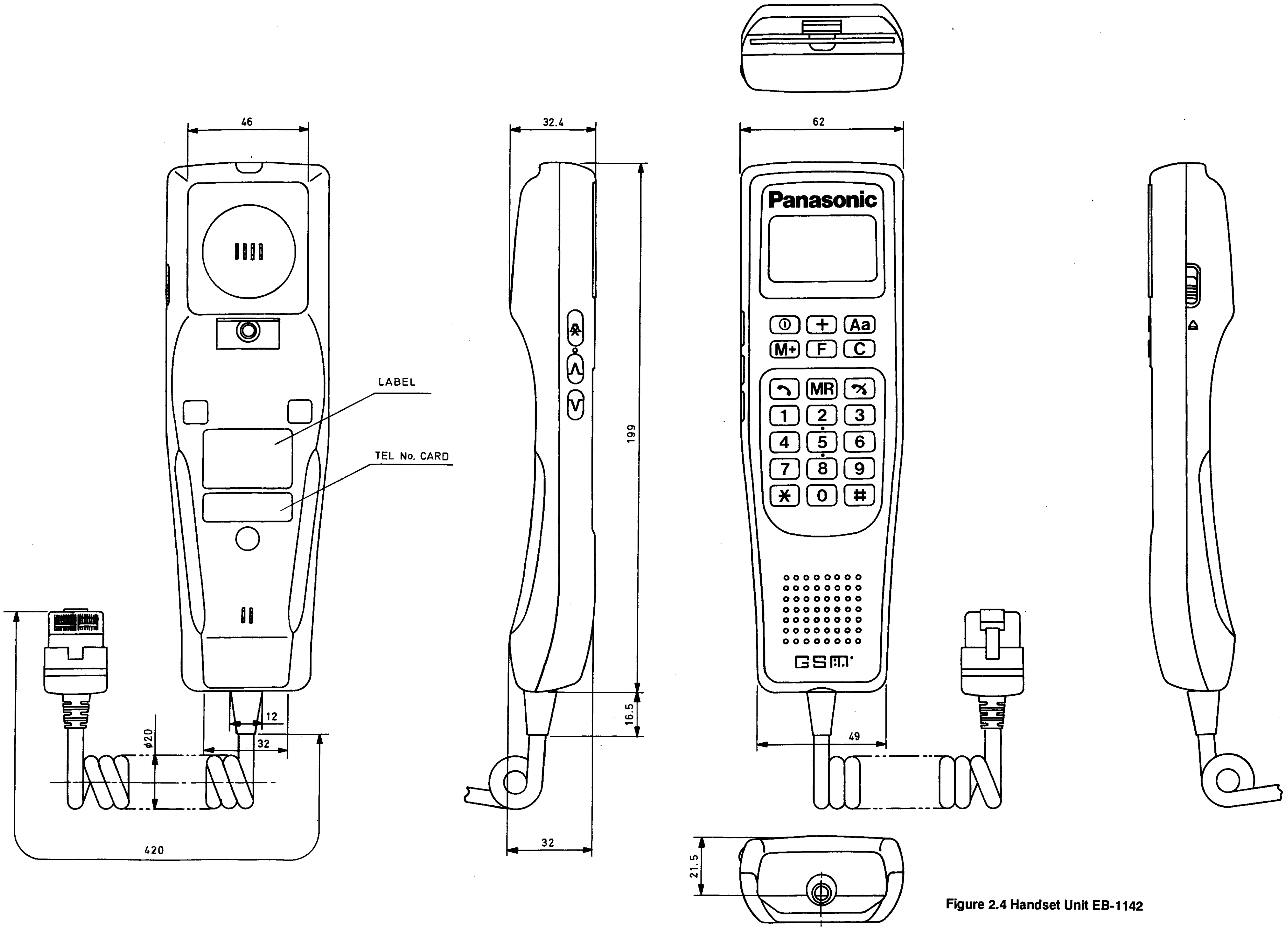
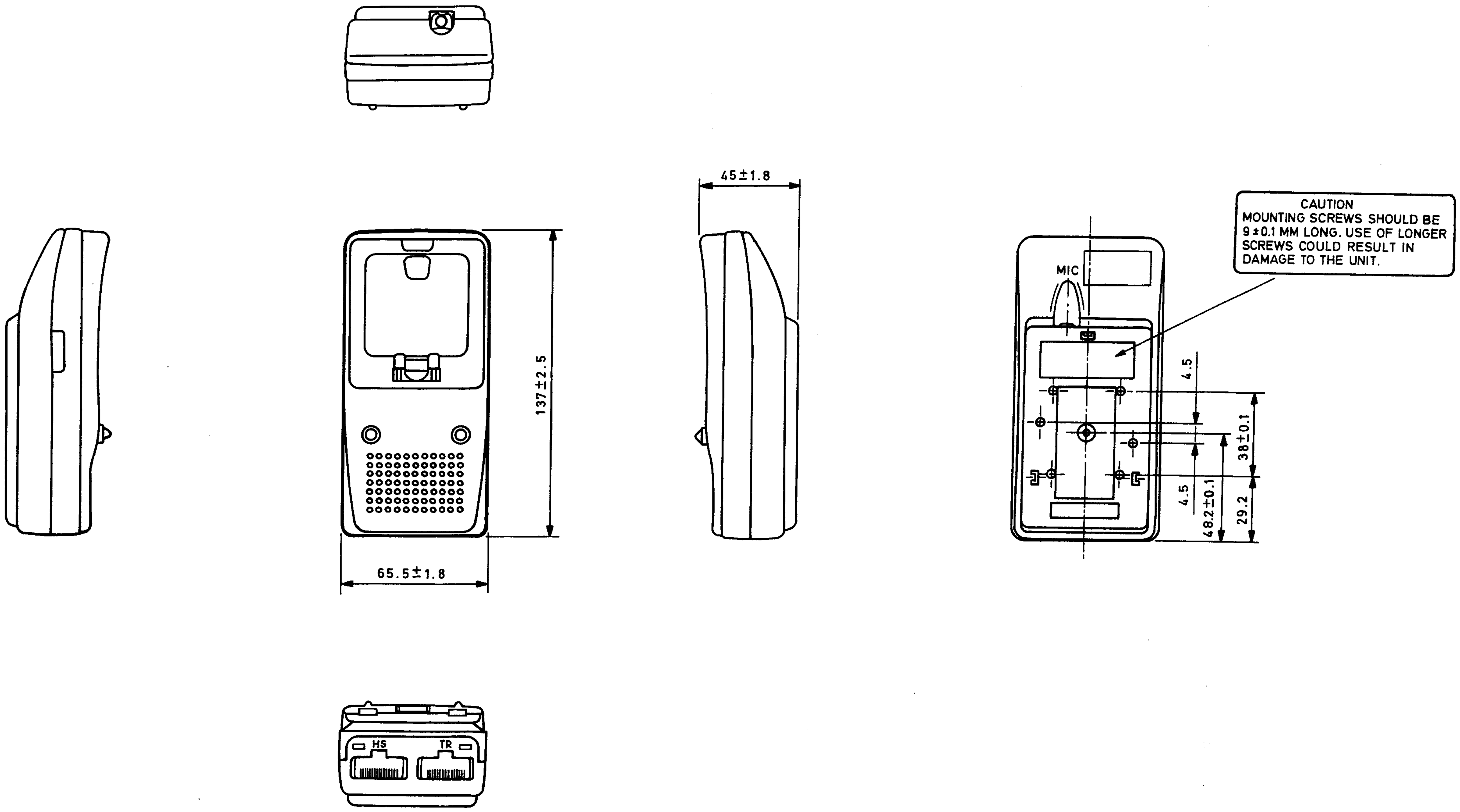

46
32.4
62
LABEL
TEL No. CARD
199
16.5
12
32
ø20
420
32
49
21.5
Panasonic
Aa
M+
F
C
MR
1
2
3
4
5
6
7
8
9
0
#
GSM

Figure 2.4 Handset Unit EB-1142


45±1.8
137±2.5
65.5±1.8
HS
TR
MIC
4.5
38±0.1
4.5
48.2±0.1
29.2

CAUTION
MOUNTING SCREWS SHOULD BE 9 ±0.1 MM LONG. USE OF LONGER SCREWS COULD RESULT IN DAMAGE TO THE UNIT.

Figure 2.5 Handsfree Cradle Unit EB-J03467

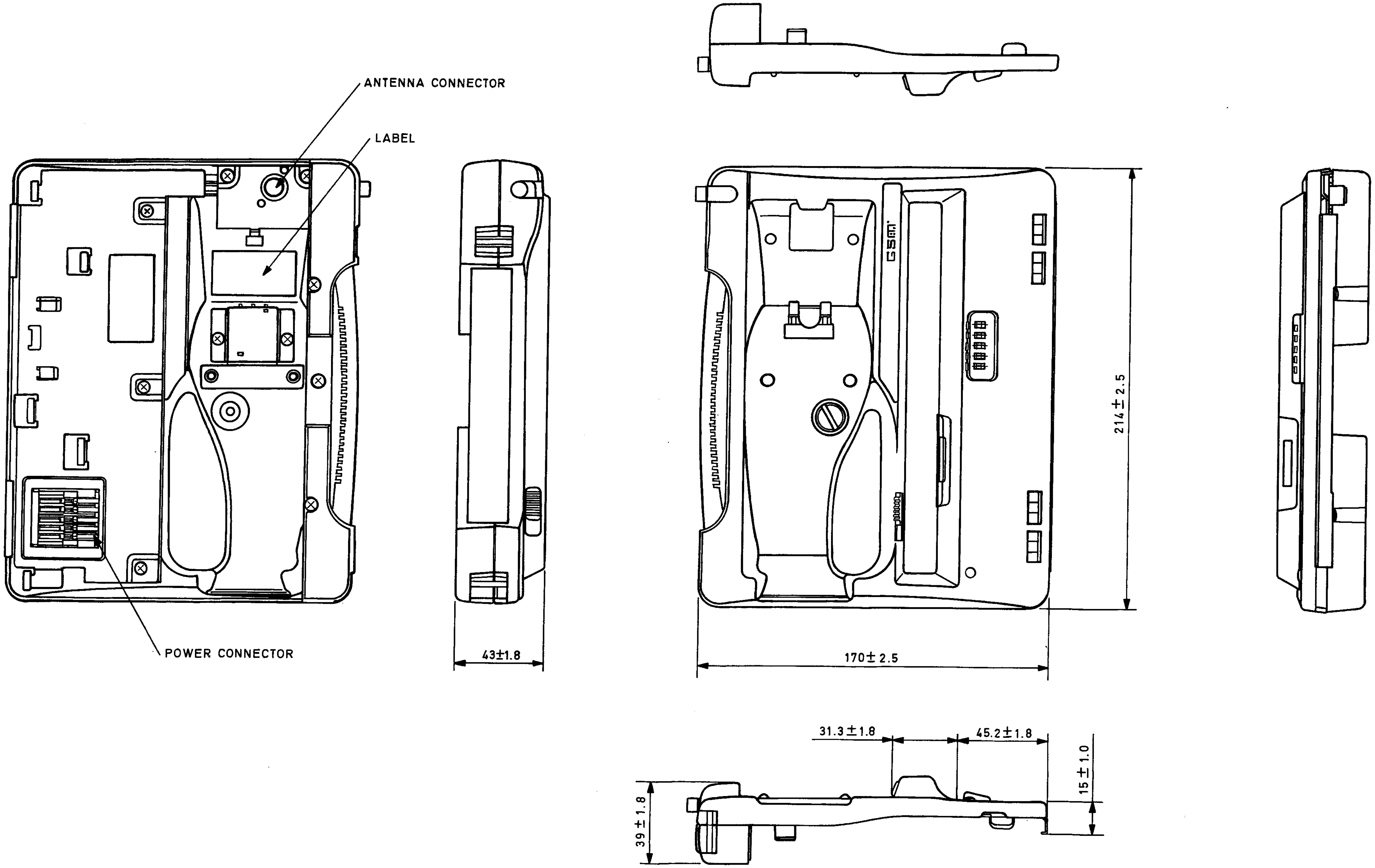
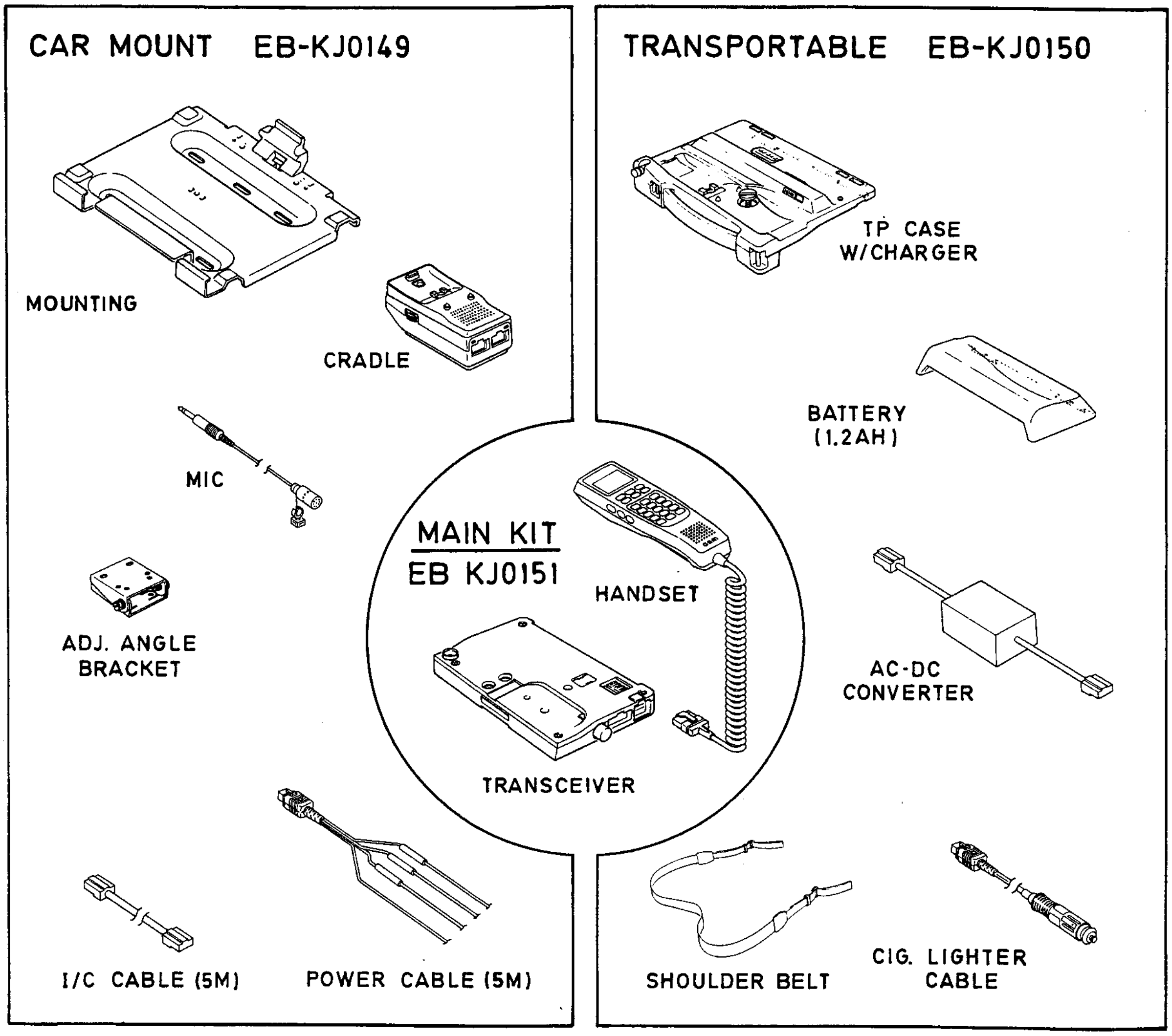

ANTENNA CONNECTOR
LABEL
POWER CONNECTOR
43±1.8
GSM
214±2.5
170±2.5
31.3±1.8
45.2±1.8
15±1.0
39±1.8

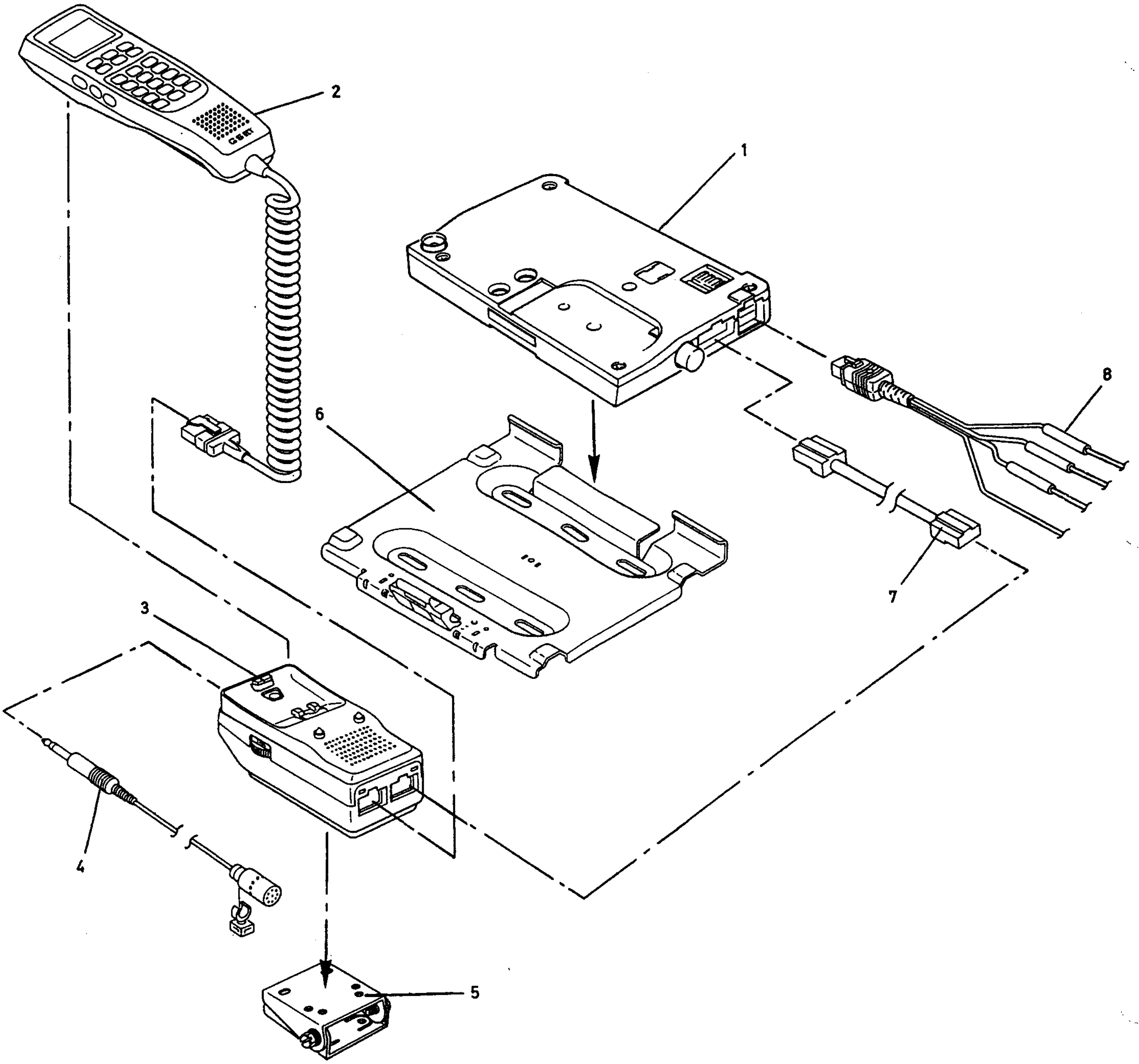
Figure 2.6 Transportable Case Unit EB-J03468


CAR MOUNT EB-KJ0149
MOUNTING
CRADLE
MIC
ADJ. ANGLE BRACKET
I/C CABLE (5M)
POWER CABLE (5M)
TRANSPORTABLE EB-KJ0150
TP CASE W/CHARGER
BATTERY (1.2AH)
AC-DC CONVERTER
SHOULDER BELT
CIG. LIGHTER CABLE
MAIN KIT
EB KJ0151
HANDSET
TRANSCEIVER

CAR MOUNT OPTIONS
Horn Alert
I/C Cable (3 m)
I/C Cable (7 m)
Power Cable (3 m)
Power CAble (7 m)

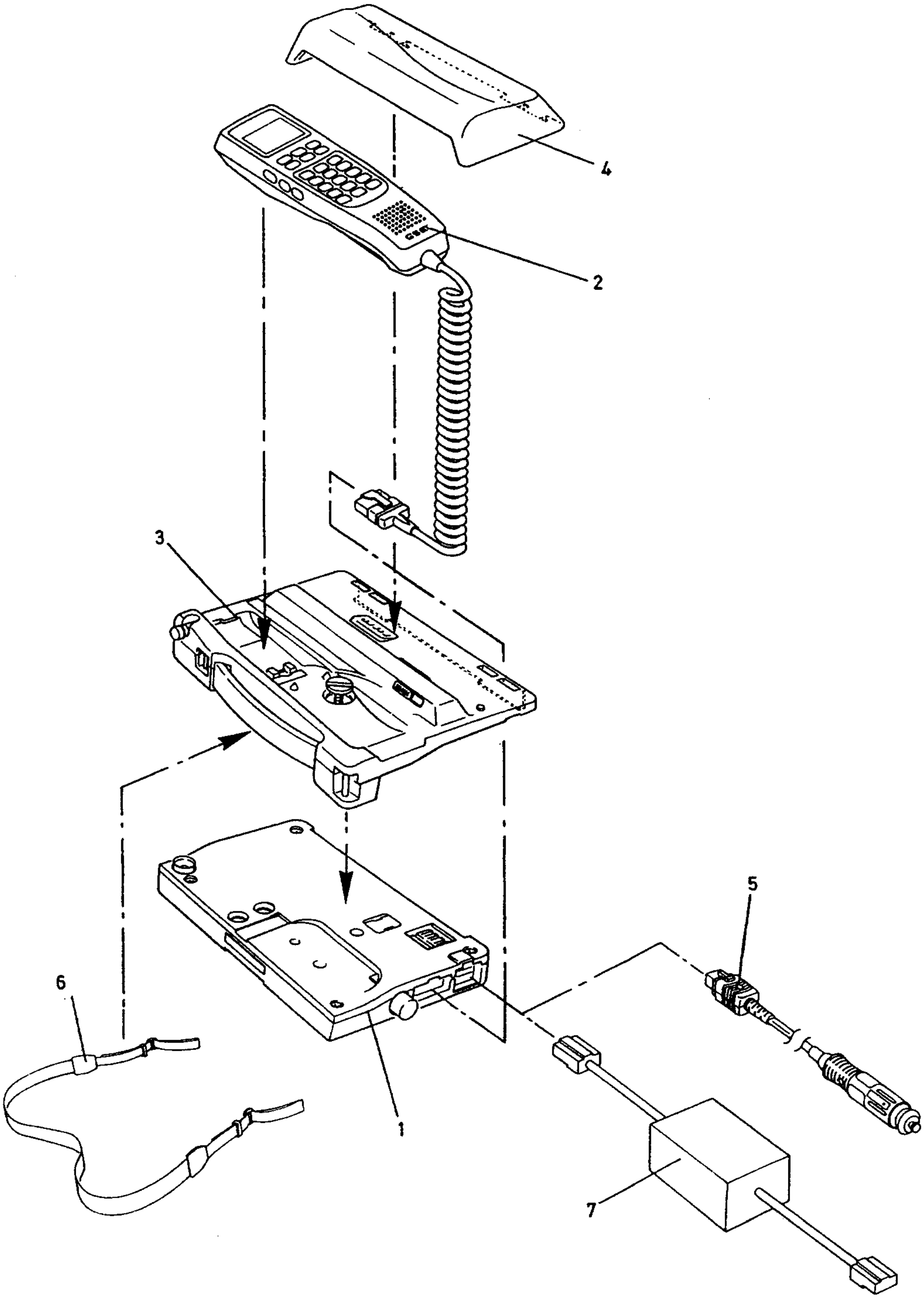
TRANSPORTABLE OPTIONS
DC Rapid Charger
Battery (1.8 AH)
Carrying Bag
Data Adapter
Data Adapter Cable

Figure 2.7 Basic/Optional Kit Compositions



IDENT No.	DESCRIPTION	PART NUMBER
1	Transceiver	EB-2803
2	Handset	EB-1142
3	Handsfree Cradle	EB-J03467
4	Microphone	EB-M0108
5	Adj. Angle Bracket	EB-N0001
6	Transceiver Mounting	EB-N01226
7	Interconnecting Cable (5 m)	EB-W01616
8	Power Cable (5 m)	EB-W0129

Figure 2.8 Car Mount Kit Composition



IDENT No.	DESCRIPTION	PART NUMBER
1	Transceiver	EB-2803
2	Handset	EB-1142
3	Transportable Case	EB-J03468
4	Battery (1.2 AH)	EB-P02740
5	Cig. Lighter Cable	EB-W0071
6	Shoulder Belt	EB-B0169
7	AC-DC Converter	EB-P02741 (UK) EB-P10125 (EU)

Figure 2.9 Transportable Kit Composition

3. TECHNICAL DESCRIPTION

3.1 INTRODUCTION

This chapter provides system interface details together with full technical descriptions for the major components of the GSM Mobile Telephone system. The Transceiver Unit is the subject of a separate publication (the associated Technical Manual) and so, for this unit, information provided in this manual is limited to a functional diagram of the unit, together with test point details for the Transceiver pcb.

3.2 SYSTEM INTERFACE

3.2.1 GENERAL

A system interconnection diagram, detailing connections to/from the Transceiver, Handsfree Cradle and Handset Units, is provided at Figure 3.1. Transportable battery interface connections are shown at Figure 3.2.

Detailed information on the pins/signals of each Transceiver connector is provided in Tables 3.1 to 3.5, as listed below:

(1) Table 3.1 Connector J2 - Handset/Handsfree Interface.

(2) Table 3.2 Connector J4 - Data Adapter Interface.

(3) Table 3.3 Connector J6 - SIM Interface.

(4) Table 3.4 Connector J8 - Power Interface.

(5) Table 3.5 Connector J10 - Battery Interface.

Table 3.1 Connector J2 - Handset/Handsfree Interface
(Connector type : NT10-16SAG (JAE))

PIN ASSIGNMENT	SIGNAL	DESCRIPTION
1	SERIAL (F)	Output Data to Handset. Output level : High > 4.0 V Low < 0.5 V
2	CU POWER	Non-Switched DC Power for Handset and Handsfree Cradle
3	POWER ON/OFF	Power Sense from Handset. Power ON: Ground Power OFF: Open Circuit
4	POWER KEY STATE	Power Key Sense from Handset. Power key Enable: Ground Power key Disable: Open Circuit
5	SERIAL (R)	Input Data from Handset. Input Threshold: High > 4.0 V Low < 0.5 V
6	GND	Ground: 0V

Table 3.1 Connector J2 - Handset/Handsfree Interface (cont'd)
(Connector type : NT10-16SAG (JAE))

PIN ASSIGNMENT	SIGNAL	DESCRIPTION
7	Rx AUDIO	Audio Signal to Handset. Max Level: 0.88V rms. Output Impedance < 100 Ω
8	Tx AUDIO	Audio Signal from Handset. Max level: 0.88V rms. Input impedance: 10 kΩ
9	EXT SIM RST	Reset for SIM Card. High: Active > 4.0 V Low: Inactive < 0.5 V
10	EXT SIM I/O	Data I/O for SIM Card. High: > 4.0 V Low: < 0.5 V
11	EXT SIM DIR	I/O Direction for SIM Card. Data to SIM: Low < 0.5 V Data from SIM: High > 4.0 V
12	EXT SIM	SIM Card Sense. Enabled: Low < 0.5 V Disabled: High > 4.0 V
13	SIM ID	Select Signal for SIM. SIM Card: Low < 0.5 V Plug IN SIM: High > 4.0 V
14	HF ON/OFF	Handsfree Control Output. Handsfree On: Low < 0.5 V Handsfree Off: High > 4.0 V
15	HF ENABLE	Handsfree Cradle Sense. Enabled: Low < 0.5 V Disabled: High > 4.0 V
16	LOGIC POWER	Power State Output to Handsfree. Logic Power ON: High > 4.0 V Logic Power OFF: Open Circuit
SHIELD CASE	SHIELD GND	Ground: 0V

Table 3.2 Connector J4 - Data Adapter Interface
(Connector type: 88333-040 (Dupont))

PIN ASSIGNMENT	SIGNAL	DESCRIPTION
1, 2	+5V	Power for Interface Board (5 V ±10%)
3	PA POWER	Power for Data Adapter Board (same as PA Power Level)
4	TSTFS	Frame Synchronisation Output Signal (8 kHz)
5	CTL FROM DA	Control Data from Data Adapter
6	TSTCLK	Transmit and Receive Output Clock Signal (128 kHz)
7	CTL TO DA	Control Data to Data Adapter
8	TST PRT 2	Decoder Data Output Signal (128 kbits/s)
9	DA ON BAR	Enable Signal for Data Adapter (Active Low).
10	TST PRT 1	Encoder Data Input Signal (128 kbits/s)
11	CT108 IN	Control Signal from Data Adapter
12	RSFM	Rx Frame Marker Output Signal to DAI Board

Table 3.2 Connector J4 - Data Adapter Interface (cont'd)
(Connector type: 88333-040 (Dupont))

PIN ASSIGNMENT	SIGNAL	DESCRIPTION
13	Tx CLK	Transmit Data Clock (output)
14	TSFM	Tx Frame Marker Output Signal to DAI Board
15	Tx STROBE	Transmit Strobe Signal (output)
16	DAINIT	Signal Initialising the internal state of DAI Board.
17	Tx DATA	Transmit Data from Data Adapter
18	ENCN DEC	Indicator of Encoder Test or Decoder Test to DAI Board
19	DT	Data Available Signal from Data Adapter
20	ANLP	Indicator of Analogue Audio Loopback to DAI Board
21	Rx CLK	Receive Data Clock (input)
22	DIGLP	Indicator of Digital Audio Loopback to DAI Board
23	Rx DATA	Receive Data to Data Adapter
24	13 MHz SYS CLK	13 MHz Clock signal for DAI Board
25	Rx RDY	Receive Ready Signal (output)
26, 27	N.C.	
28	PA GATING	PA Gating Signal (Active High)
29	N.C.	
30	Tx WIN	Tx Window Signal (Active High)
31	N.C.	
32	Tx MOD DATA	Inverse Differentially Encoded Data output
33	N.C.	
34	Tx MOD CLK	Encoded Data output Clock
35	N.C.	
36	EQ DATA	Equaliser Serial Data Output
37	N.C.	
38	EQ CLK	Equaliser Serial output Data Clock
39, 40	GND	Ground: 0V

Table 3.3 Connector J6 - SIM Interface
(Connector type: JC10.A08T2AI (JAE))

PIN ASSIGNMENT	SIGNAL	DESCRIPTION
1	+5V	Power: 5 V ±10% for Plug-In SIM
2	INT SIM RST	Reset for Plug-In SIM. High: Active Low: Inactive
3	INT SIM CLK	Clock for Plug-In SIM. 3.5712 MHz Low: Inactive
4	N.C.	
5	GND	Ground : 0V
6	N.C.	
7	INT SIM IO	Data I/O for Plug-In SIM. High: > 4.0 V Low: < 0.5 V
8	N.C.	

Table 3.4 Connector J8 - Power Interface
(Connector TYPE: 5569-06A2-BL (MOLEX))

PIN ASSIGNMENT	SIGNAL	DESCRIPTION
1	CAR BATTERY	Power: 13.2 V ±10%
2	GND	Ground: 0V
3	HORN ALERT	Horn Alert Control: open collector output
4	TEST	Input Data from Test Equipment. Test Mode: Ground
5	RADIO MUTE (mute HIFI)	Radio Mute Control: open collector output
6	IGNITION	Ignition ON: Car Battery Level Ignition OFF: Open Circuit

Table 3.5 Connector J10 - Battery Interface
(Connector type: MR 122-5R (HIROSE))

PIN ASSIGNMENT	SIGNAL	DESCRIPTION
1	TP BATTERY	10 Cell NICAD Battery Power: 12.0 V
2	EXT CONT	Charge Control: open collector output
3	CHARGE	Charge Power: Car Battery Level
4	GND	Ground: 0V
5	BAT TEMP	Battery Temperature Data from Battery

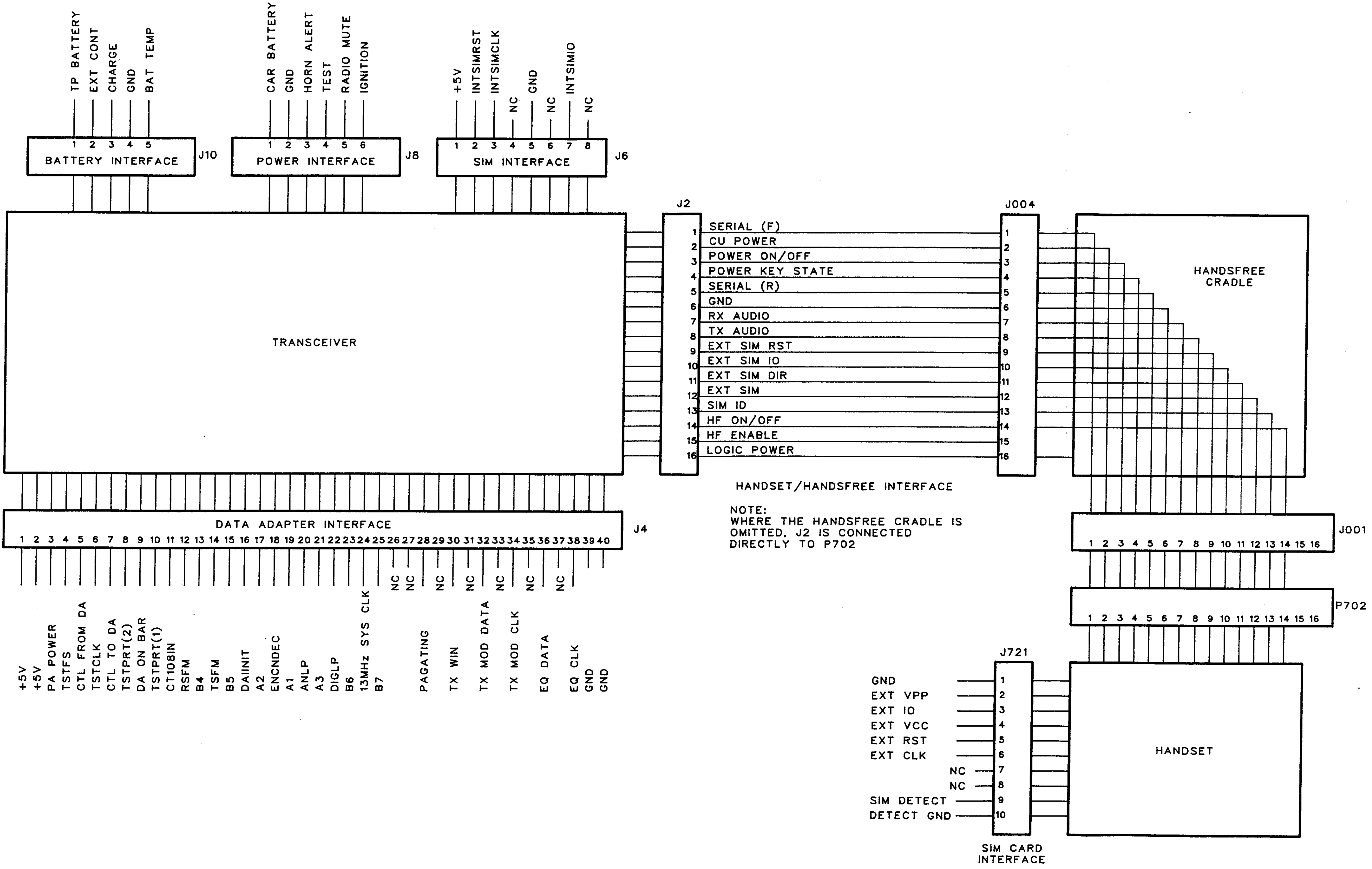

TP BATTERY
EXT CONT
CHARGE
GND
BAT TEMP
1 2 3 4 5
BATTERY INTERFACE
J10
CAR BATTERY
GND
HORN ALERT
TEST
RADIO MUTE
IGNITION
1 2 3 4 5 6
POWER INTERFACE
J8
+5V
INTSIMRST
INTSIMCLK
NC
GND
NC
INTSIMIO
NC
1 2 3 4 5 6 7 8
SIM INTERFACE
J6
TRANSCEIVER
J2
J004
1 SERIAL (F)
2 CU POWER
3 POWER ON/OFF
4 POWER KEY STATE
5 SERIAL (R)
6 GND
7 RX AUDIO
8 TX AUDIO
9 EXT SIM RST
10 EXT SIM IO
11 EXT SIM DIR
12 EXT SIM
13 SIM ID
14 HF ON/OFF
15 HF ENABLE
16 LOGIC POWER
HANDSFREE CRADLE
HANDSET/HANDSFREE INTERFACE
NOTE:
WHERE THE HANDSFREE CRADLE IS OMITTED, J2 IS CONNECTED DIRECTLY TO P702
DATA ADAPTER INTERFACE
J4
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40
+5V
+5V
PA POWER
TSTFS
CTL FROM DA
TSTCLK
CTL TO DA
TSTPRT(2)
DA ON BAR
TSTPRT(1)
CT108IN
RSFM
B4
TSFM
B5
DAIINIT
A2
ENCNDEC
A1
ANLP
A3
DIGLP
B6
13MHz SYS CLK
B7
NC
NC
PAGATING
NC
TX WIN
NC
TX MOD DATA
NC
TX MOD CLK
NC
EQ DATA
NC
EQ CLK
GND
GND
J001
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
P702
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
J721
GND 1
EXT VPP 2
EXT IO 3
EXT VCC 4
EXT RST 5
EXT CLK 6
NC 7
NC 8
SIM DETECT 9
DETECT GND 10
SIM CARD INTERFACE
HANDSET

Figure 3.1 System Interconnection Diagram

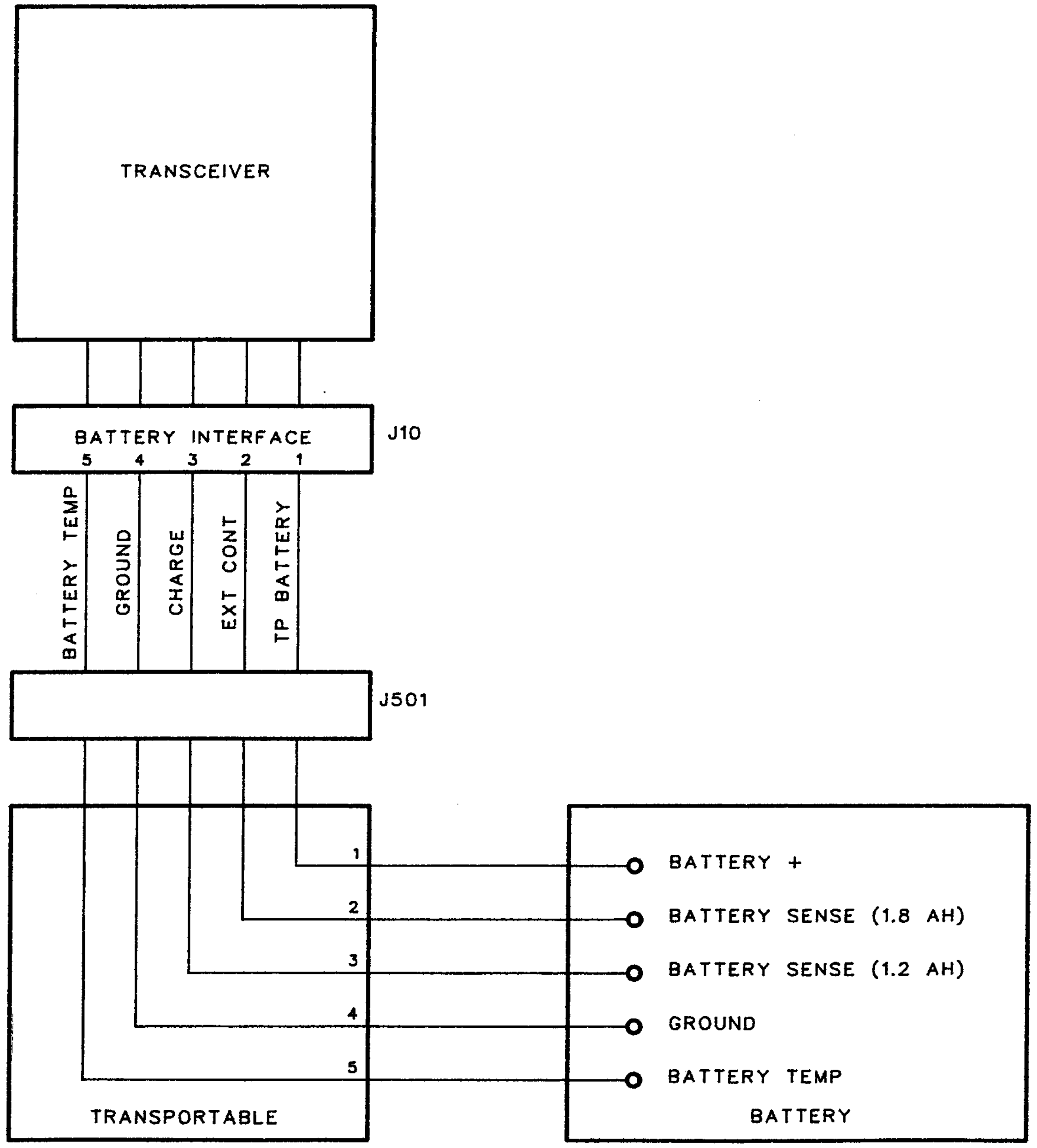

TRANSCEIVER
BATTERY INTERFACE
J10
5 4 3 2 1
BATTERY TEMP
GROUND
CHARGE
EXT CONT
TP BATTERY
J501
1
2
3
4
5
TRANSPORTABLE
BATTERY +
BATTERY SENSE (1.8 AH)
BATTERY SENSE (1.2 AH)
GROUND
BATTERY TEMP
BATTERY

Figure 3.2 Transportable Battery Interface Diagram

3.3 HANDSET UNIT

3.3.1 GENERAL

The following is a technical description for the Handset Unit EB-1142. A block diagram of the Handset Unit is provided at Figure 3.5, with a full circuit diagram and PCB component layout diagrams given at Figures 3.6 to 3.8.

The principal functional blocks within the Handset Unit are:

(1) Tx Audio Section.

(2) Rx Audio Section.

(3) Rx Audio Volume Control.

(4) SIM Interface.

(5) Logic Control.

(6) Key Input Selection.

(7) Hook Switch Section.

(8) Reset Circuit.

(9) Keypad/LCD Illumination.

(10) Voltage Regulator Circuits.

(11) Liquid Crystal Display.

3.3.2 Tx AUDIO SECTION

Voice audio is detected by the microphone MK701, and applied to amplifier stage U708.2. The amplified Tx AUDIO signal from U708.2 is fed via U707, the Tx MUTE switch, to P702 pin 8, from where it is connected to the Transceiver Unit. The Tx MUTE switch is activated by U701 CPU, Pin 43.

R750 samples the Tx AUDIO signal and feeds the sample into the Rx AUDIO path as SIDETONE.

3.3.3 Rx AUDIO SECTION

The Rx AUDIO signal at P702 pin 7 is fed to amplifier/attenuator stage U703.1, the output from which is fed to either the speaker circuit (LS702) or to the receiver circuit (LS701), as selected by electronic switches U707.1 and U707.2. These switches are operated by U701, CPU Pin 44 and Pin 42 respectively, for speaker mute and receive mute .

The speaker circuit uses U706 to amplify signals to the handset speaker. The receiver circuit uses U708.1 and U703.2 as a differential amplifier to drive the earpiece with two signals, 180° out of phase.

3.3.4 Rx AUDIO VOLUME CONTROL

The Rx AUDIO volume control circuit is reproduced in Figure 3.3 below.

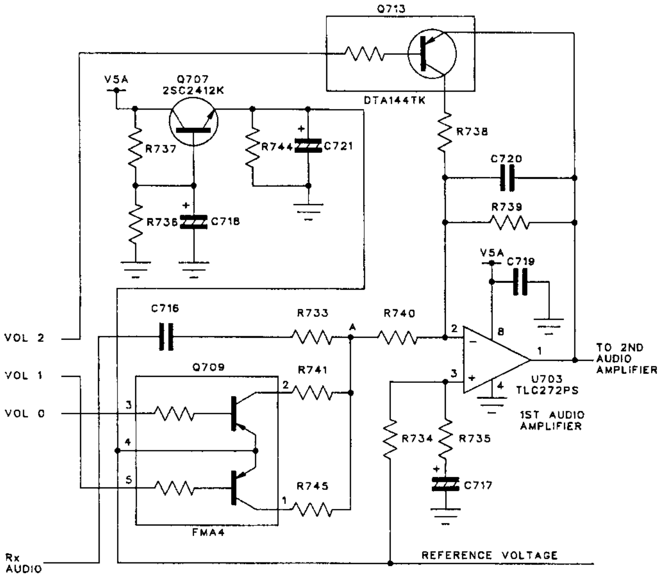

Q713
DTA144TK
V5A
Q707
2SC2412K
R737
R736
C718
R744
C721
R738
C720
R739
V5A
C719
C716
R733
A
R740
VOL 2
VOL 1
VOL 0
Q709
R741
R745
FMA4
2
3
4
5
1
8
U703
TLC272PS
1ST AUDIO AMPLIFIER
TO 2ND AUDIO AMPLIFIER
R734
R735
C717
Rx AUDIO
REFERENCE VOLTAGE

Figure 3.3 Rx AUDIO Volume Control Circuit

The Rx AUDIO volume control circuit provides 5 volume levels from 1 (lowest) to 5 (highest). The volume levels are selected by 3 logic lines from the CPU, which control two devices to set the volume level.

The first device is PNP transistor Q713, used as a switch. Q713 is used to switch resistor R738 into the feedback path of U703.1, thereby reducing its gain, i.e. with R738 switched into the feedback path, the resistance of the feedback path is reduced, and hence the gain of the amplifier.

The second device is an AC attenuator positioned on the receive audio line. Transistor Q709 is used as a switch to control the attenuation at point A in the circuit. By switching on and off the two transistors comprising Q709, the resistance between point 'A' and ground can be changed to alter the attenuation at point 'A'.

Table 3.6 below, gives the truth table for the volume levels: the most significant control bit is VOL 2 and the least significant control bit is VOL 0.

Table 3.6 Volume Control

Volume Level	Vol 2	Vol 1	Vol 0	State of Audio path
1	0	1	0	Min audio gain. Max audio attenuation at A
2	0	1	1	Min audio gain. Min audio attenuation at A
3	1	0	1	Max audio gain. Max audio attenuation at A
4	1	1	0	Max audio gain. Min audio attenuation at A
5	1	1	1	Max audio gain, no audio attenuation at A

3.3.5 SIM INTERFACE

The GSM Handset is designed to accept a SIM card containing user personal information which takes priority over information from a SIM module if fitted to the Transceiver.

The SIM card incorporates a miniature CPU with the User personal information held in memory. When the SIM card is inserted, the Handset provides the following signals to the SIM card (via J701):

(1) EXT CLK - J701 pin 5.

(2) EXT VPP - J701 pin 9.

(3) EXT RST - J701 pin 6.

(4) EXT VCC - J701 pin 7.

Information from the SIM card can then be down loaded from the card in serial form via the EXT I/O line (J701 pin 8). This information is passed via buffer U714 to P702 pin 10, from where it is connected to the Transceiver Unit.

The presence of the SIM card is detected via the SIM DETECT input at J701 pin 2 (low indicates SIM card present). This signal is sent to the Transceiver Unit via U712.1, U715.4 and Q717 (buffering); EXT SIM is output to the Transceiver Unit at P702 pin 12. When the Transceiver Unit detects EXT SIM, it disables the internal SIM module (if fitted) and proceeds to load User personal information from the SIM card (via the Handset).

3.3.6 LOGIC CONTROL

The Handset and Transceiver Units communicate via two serial data lines, serial forward data and serial reverse data. The Transceiver uses the serial forward data line to communicate with the Handset, whilst the Handset uses the serial reverse data line to communicate with the Transceiver. The Handset CPU and the main CPU in the Transceiver Unit exchange information on these two lines to provide control of the mobile. Refer to Section 3.2 for interface details.

3.3.7 KEY INPUT SELECTION

Key input selection is arranged in a matrix formation (six rows by four columns). The six rows are Key Scan 0 to Key Scan 5 (U701 Pin 53, Pin 52, Pin 51, Pin 50, Pin 23, Pin 20) and these are fed back to the CPU, when keys are pressed, on column lines connected to U701 Pin 49, Pin 48, Pin 47, Pin 46.

Power On/Off uses a separate line and provides GND to U701, Pin 12 when pressed.

3.3.8 HOOK SWITCH SECTION

The Hook Switch (S702) detects whether the Handset is in or out of the cradle, allowing the correct audio route to be selected, i.e. either Handsfree or Handset. In this way a call can be answered by lifting the Handset off the cradle, and ended by simply replacing the Handset. To select Handsfree operation when using Handset mode, press Mute before replacing the Handset. The call can now continue with the Handset in the Handsfree Cradle without terminating the call.

3.3.9 RESET CIRCUIT

The voltage detector U702 generates a reset signal to initialise U701 at power on, and in addition when the DC supply voltage is decreased.

3.3.10KEYPAD AND LCD BACKLIGHT ILLUMINATION

The keypad/LCD backlight illumination is controlled by U701. The colour can be changed between amber and green by the User. This is achieved by the use of a dual colour LED package (DS 730), which when biased in one direction shows green, and in the other direction shows amber.

U701 controls the illumination circuit using Pin 61 and Pin 39 as control lines:

Table 3.7 Illumination Colour Control

P14	P56	Illumination Colour
1	0	Amber
1	1	Green

3.3.11VOLTAGE REGULATOR CIRCUITS

The following voltage regulator circuits are provided:

(1) Q711, 9 V regulator for the speaker circuit amplifier.

(2) Q705, 5 V regulator to supply U701 (CPU).

(3) Q706, 5 V regulator to supply the transmit audio circuit and receiver circuit.

(4) Q707, 2.5 V regulator to set bias on the input to U703/U708 on the Rx AUDIO path.

3.3.12LIQUID CRYSTAL DISPLAY

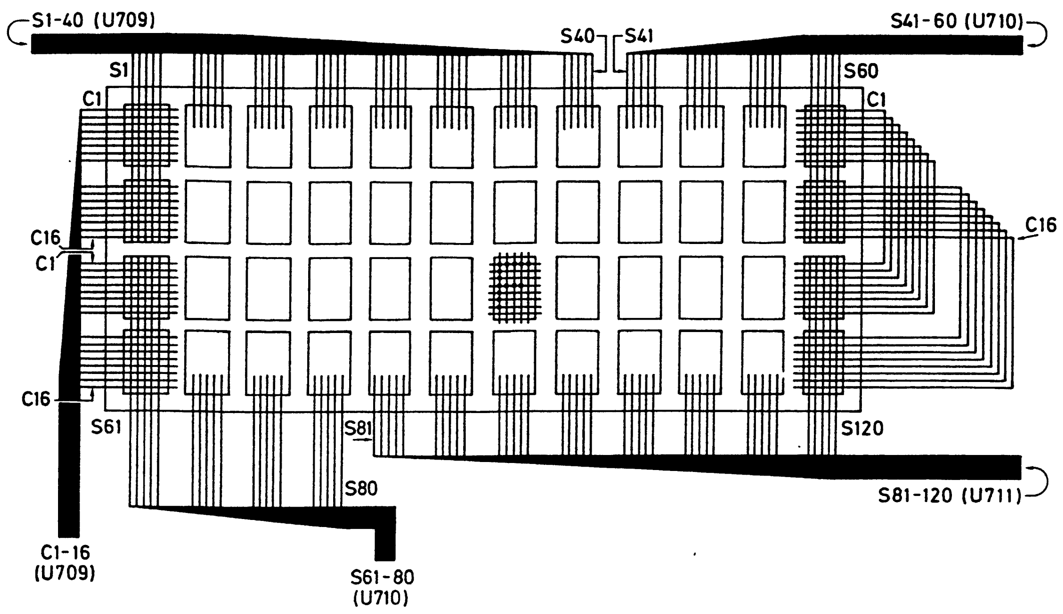
Figure 3.4 shows the overall LCD arrangement and associated COM/SEG connections, together with a close up of one of the character displays.

The Liquid Crystal Display DS731 is a 48 character module (refer to Figure 3.4 (a)), capable of displaying both alpha and numeric characters. Alpha numeric characters are displayed according to control lines applied in a matrix format comprising 16 COM lines and 120 SEG lines. The 16 COM lines are generated by U709, with the 120 SEG lines generated by U709 (40 lines), U710 (40 lines) and U711 (40 lines).

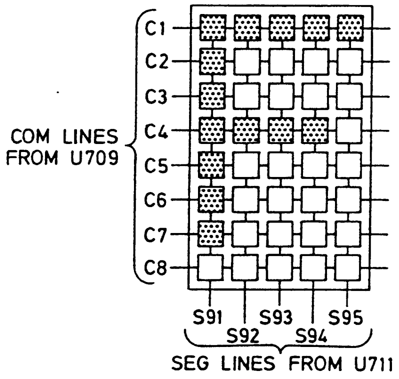
Each character display contains 40 pixels, each of which is addressed by a combination of 1 COM line and 1 SEG line. Pixel refresh timing is derived from a 1.2 kHz clock signal: COM lines are produced consecutively at each clock pulse, with data being supplied via the SEG lines.

The data applied via the SEG lines determines whether each pixel is illuminated or extinguished, so forming the character.

In the example shown in Figure 3.4 (b), the letter F is formed (at the character display indicated) by the conditions listed in Table 3.8.


S1-40 (U709)
S40
S41
S41-60 (U710)
S1
S60
C1
C1
C16
C1
C16
C16
S61
S81
S120
S80
S81-120 (U711)
C1-16
(U709)
S61-80
(U710)

(a) Overall Arrangement


C1
C2
C3
C4
C5
C6
C7
C8
COM LINES
FROM U709
S91
S93
S95
S92
S94
SEG LINES FROM U711

(b) Close Up of 1 Character (Row 3, Column 7)

Fig. 3.4 LCD Arrangement and COM/SEG Connections

Table 3.8 LCD Character Generation

COM Line	Data Applied via SEG (S) Line(s)
1	S91, S92, S93, S94, S95
2	S91
3	S91
4	S91, S92, S93, S94
5	S91
6	S91
7	S91
8	-

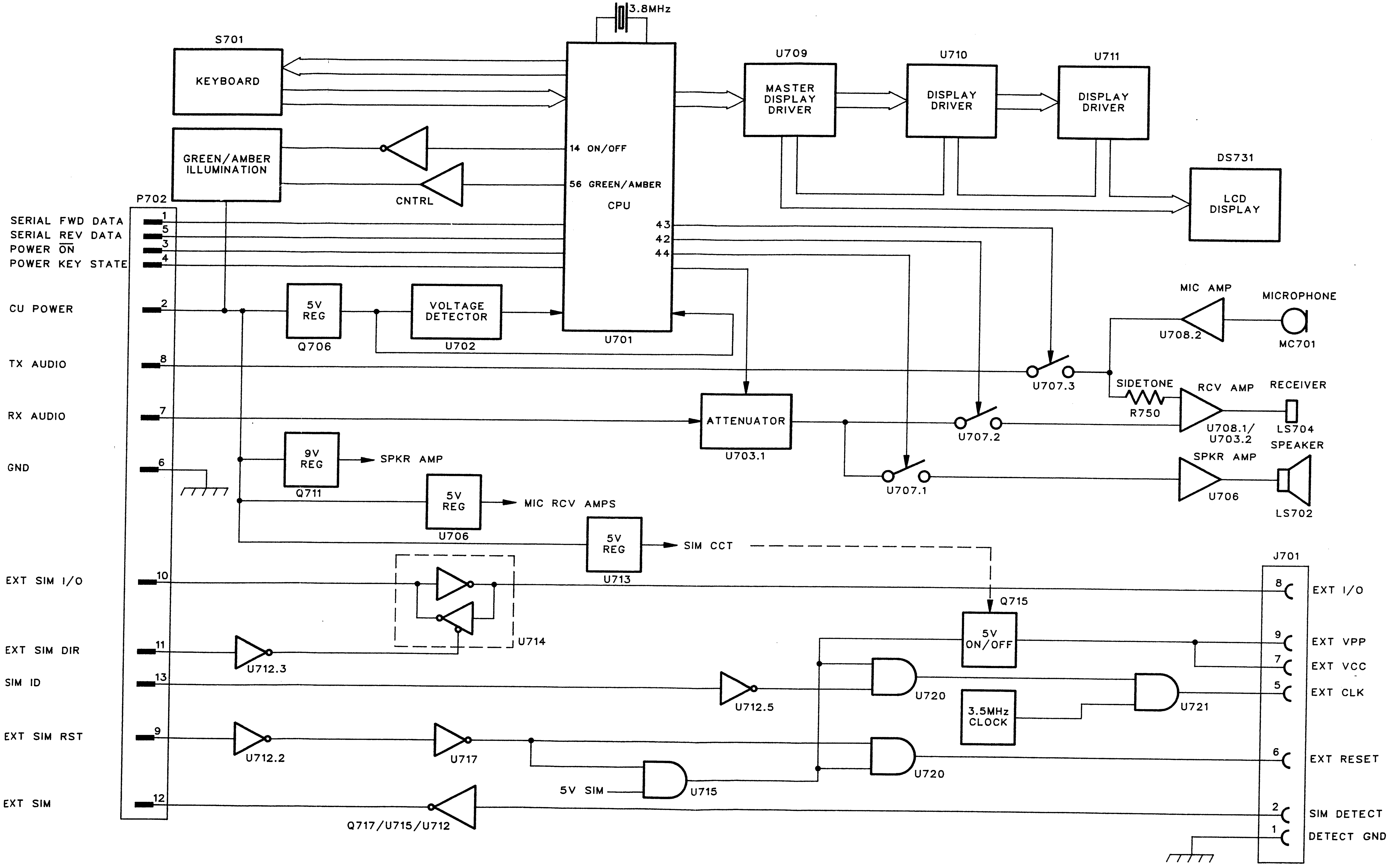
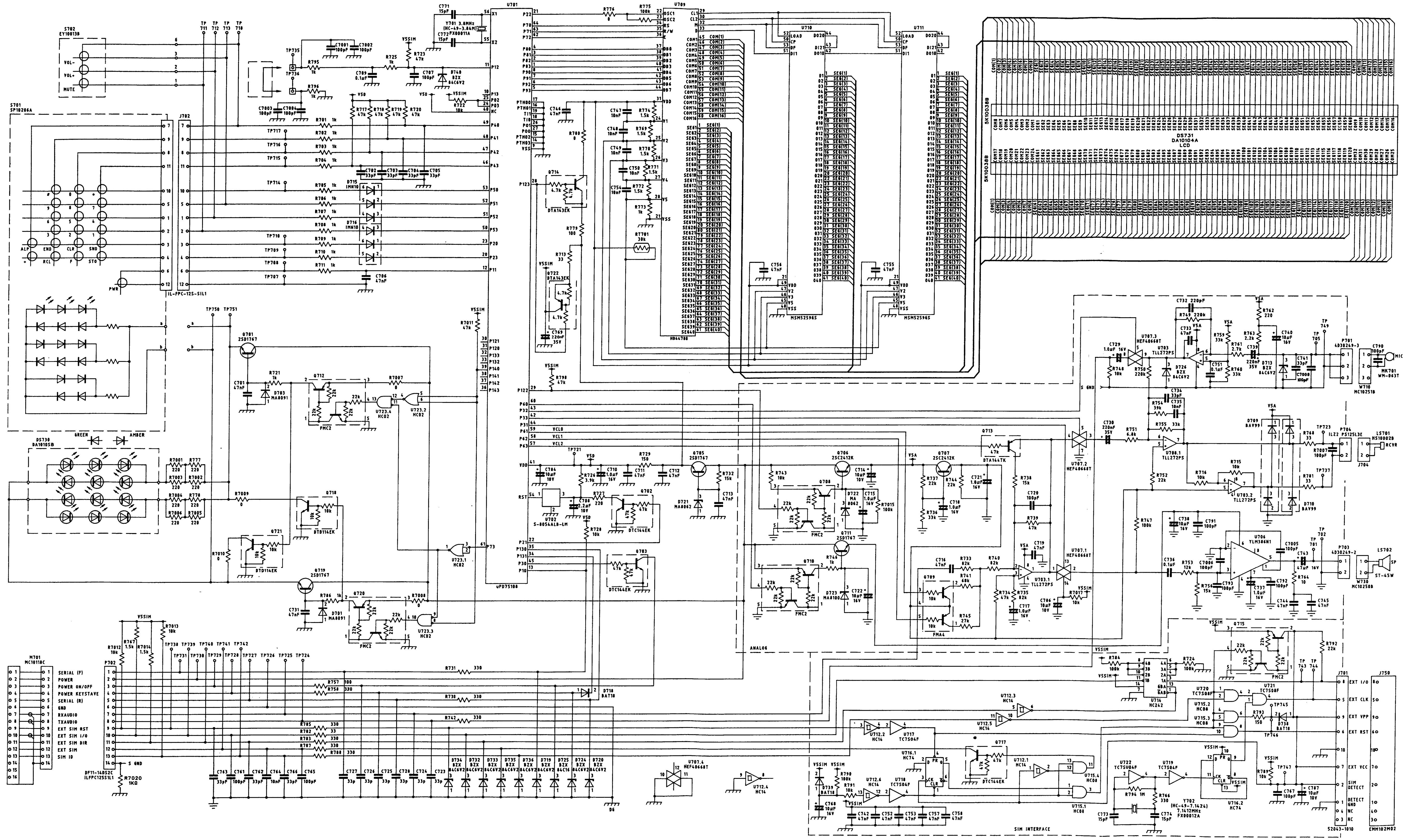

3.8MHz
S701
KEYBOARD
GREEN/AMBER ILLUMINATION
CNTRL
14 ON/OFF
56 GREEN/AMBER
CPU
43
42
44
U701
U709
MASTER DISPLAY DRIVER
U710
DISPLAY DRIVER
U711
DISPLAY DRIVER
DS731
LCD DISPLAY
P702
SERIAL FWD DATA
SERIAL REV DATA
POWER ON
POWER KEY STATE
CU POWER
TX AUDIO
RX AUDIO
GND
EXT SIM I/O
EXT SIM DIR
SIM ID
EXT SIM RST
EXT SIM
1
5
3
4
2
8
7
6
10
11
13
9
12
5V REG
Q706
VOLTAGE DETECTOR
U702
9V REG
Q711
SPKR AMP
5V REG
U706
MIC RCV AMPS
5V REG
U713
SIM CCT
MIC AMP
U708.2
MICROPHONE
MC701
U707.3
SIDETONE
R750
RCV AMP
U708.1/ U703.2
RECEIVER
LS704
ATTENUATOR
U703.1
U707.2
U707.1
SPEAKER
SPKR AMP
U706
LS702
U714
U712.3
U712.5
U712.2
U717
5V SIM
U715
U720
U720
Q715
5V ON/OFF
3.5MHz CLOCK
U721
Q717/U715/U712
J701
8
EXT I/O
9
EXT VPP
7
EXT VCC
5
EXT CLK
6
EXT RESET
2
SIM DETECT
1
DETECT GND

Figure 3.5 Handset Unit - Block Diagram


U701
uPD75108
U709
HD44780
U710
MSM5259GS
U711
MSM5259GS
DS731
DA10104A
LCD
DS730
DA10105B
GREEN
AMBER
S701
SP10206A
S702
EY10013B
VOL-
VOL+
MUTE
PWR
J702
M701
MC10116C
P702
SERIAL (F)
POWER
POWER ON/OFF
POWER KEYSTAVE
SERIAL (R)
GND
RXAUDIO
TXAUDIO
EXT SIM RST
EXT SIM I/O
EXT SIM DIR
EXT SIM
SIM ID
Y701 3.84MHz
MK701
WM-063T
LS701
LS702
ST-45M
ANALOG
SIM INTERFACE
J701
J750
EXT I/O
EXT CLK
EXT VPP
EXT RST
EXT VCC
SIM DETECT
DETECT GND
NC
52043-1010
EMM102M02

TEST CONFIGURATION : CONNECTED TO TRANSCEIVER

PART	Q701			Q702			Q703			Q705			Q706			Q707			Q708					Q709					Q710					Q711			Q712					Q713			Q714			Q715					Q717			Q718			Q719			Q720					Q721			Q722		
MODE	B	C	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C	E	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	B	C	E	1	2	3	4	5	B	C	E	B	C	E	1	2	3	4	5	B	C	E	B	C	E	B	C	E	1	2	3	4	5	B	C	E	B	C	E
INSERT SIM CARD	0.99	12.5	0.35	0	5.25	0	5.25	0	0	6.12	12.16	5.49	6.12	12.16	5.56	3.3	5.5	2.75	0	6.12	6.2	2.1	0	2.1	2.6	5.3	2.7	5.3	12.22	0.24	12.29	0	0	1.5	12.28	1.2	12.24	0	12.4	0	0	5.26	2.66	2.66	0.1	5.2	5.2	0	5.13	5.13	5.12	0	0	4.87	0	12.24	0	0	9	12.45	0.4	0	12.24	12.24	4.85	0	0	0.4	0	0	5.0	5.2

Figure 3.6 Handset Unit - Circuit Diagram

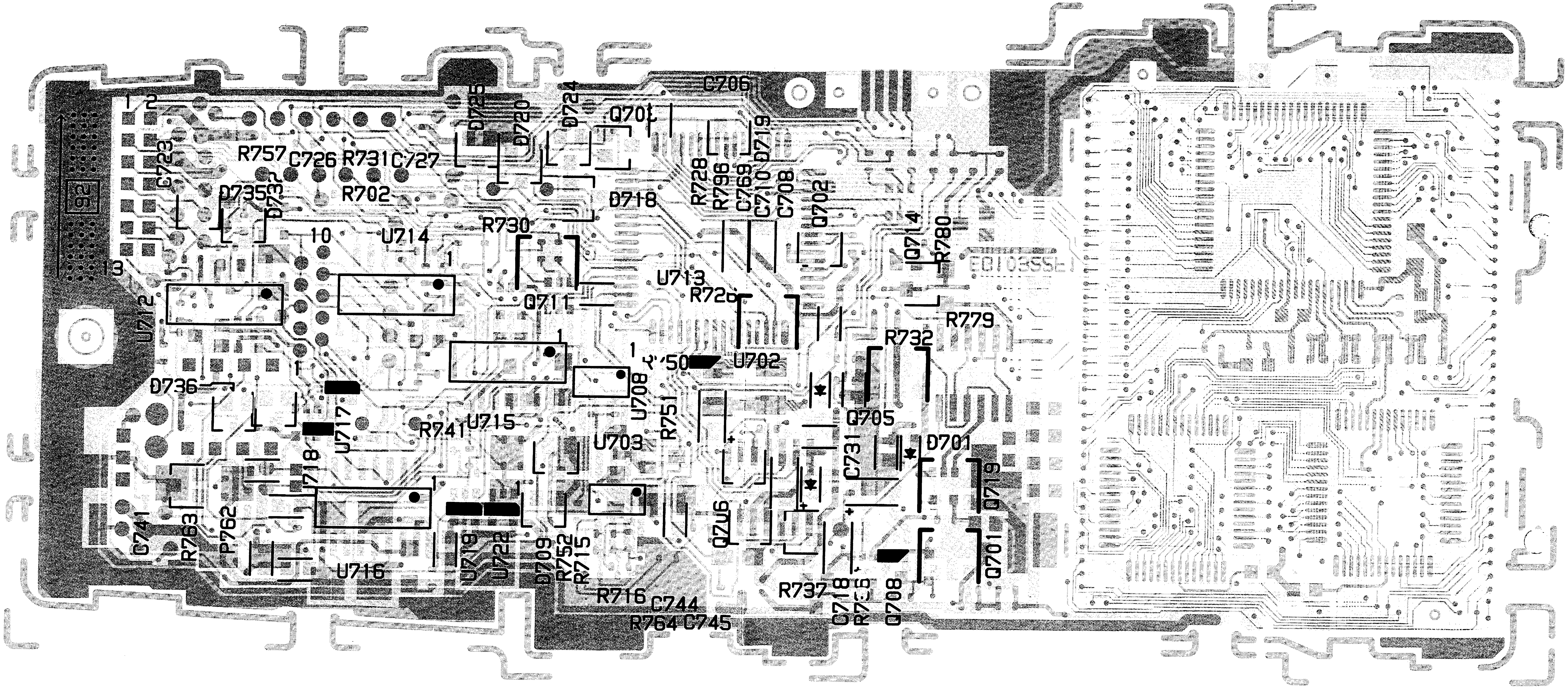

C706
D725
D720
D724
Q701
D719
R757
C726
R731
C727
C723
D735
R702
D718
R728
R796
C769
C710
C708
Q702
10
U714
R730
Q714
R780
13
U713
R726
Q711
R779
U712
R732
U702
D736
U708
R751
Q705
U717
R741
U715
U703
C731
D701
D719
U716
C741
R763
P762
U719
U722
D709
R752
R715
Q706
Q701
R716
C744
R764
C745
R737
C718
Q708

Figure 3.7 Handset Unit - PCB Component Layout (Topside)

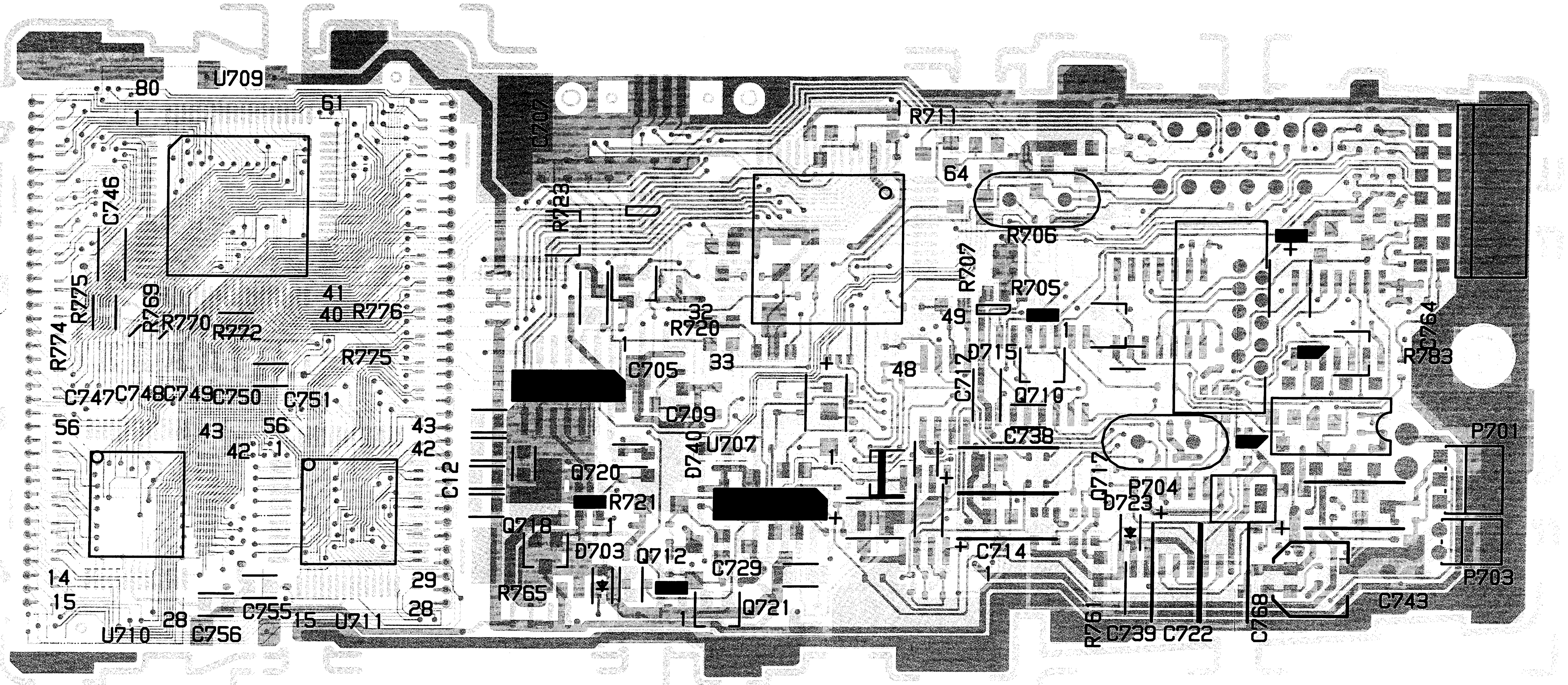

U709
80
1
61
C707
R711
R723
64
R706
R707
R705
C746
R775
R774
R769
R770
R772
41
40
R776
32
R720
33
49
C764
R783
R775
C705
48
C712
D715
Q710
C747
C748
C749
C750
C751
C709
56
43
56
42
1
43
42
D740
U707
C738
P701
C12
Q720
Q717
P704
D723
R721
Q718
D703
Q712
C729
C714
14
15
29
28
R765
Q721
C743
P703
U710
28
C756
C755
15
U711
28
R76
C739
C722
C768

Figure 3.8 Handset Unit - PCB Component Layout (Bottomside)

3.4 HANDSFREE CRADLE UNIT

3.4.1 GENERAL

The following is a technical description for the Handsfree Cradle Unit EB-J03467. A block diagram of the Handsfree Cradle Unit is provided at Figure 3.16, with a full circuit diagram and PCB component layout diagrams given at Figures 3.17 to 3.19.

The Handsfree Cradle Unit consists of a cradle and a microphone unit, and enables total handsfree operation.

The principal functional blocks within the Handsfree Cradle Unit are:

(1) Rx Audio Circuit.

(2) Tx Audio Circuit.

(3) Voice Controlled Chopper Circuit.

(4) Receive Audio Level.

(5) Microphone Unit.

(6) Handsfree Interface.

3.4.2 Rx AUDIO CIRCUIT (Figure 3.9)

The basic function of the Rx Audio circuit is to amplify the audio signal received from the Transceiver Unit, prior to being output to a loudspeaker mounted in the Handsfree Cradle Unit.

From the Transceiver Unit, the Rx AUDIO signal is buffered (U810) to provide impedance matching for the volume adjustment potentiometer (R842). Volume is User-controllable via a thumb-wheel switch on the cradle.

Following an amplification stage (U802), the Rx AUDIO signal is tapped to provide a DC reference voltage to the Voice Controlled Chopper circuit. The purpose of the Voice Controlled Chopper circuit is to alternately switch the Tx AUDIO line and the Rx AUDIO line on/off: if the two lines are simultaneously active, unwanted howling/feedback may result. Analogue switches (U812 for Rx AUDIO, U803 for Tx AUDIO) are used to mute the Rx /Tx AUDIO, with switching controlled by chopping control signals. Output from the Rx AUDIO mute switch is passed via a further buffer (U802), to another analogue switch (U813). This switch is controlled by the HF ON/OFF control line.

The final stage of the Rx AUDIO circuit is a power amplification stage, (U805), which provides signal amplification and current drive for the loudspeaker (LS801).

3.4.3 Tx AUDIO CIRCUIT (Figure 3.10)

The Tx Audio circuit conditions and amplifies the audio signals from the microphone, and then passes the audio to the Transceiver Unit for subsequent processing and transmission.

The Tx AUDIO signal is amplified (U801) and applied to an analogue switch (U803) which is controlled by the Chopper circuit, to mute the Tx AUDIO whilst the Rx AUDIO is active, and vice versa. Output from the Tx AUDIO mute switch is passed via a further buffer (U801), to another analogue switch (U814). This switch is controlled by the HF ON/OFF control line, providing on/off control of the microphone.

Finally the Tx AUDIO signal is routed to the Transceiver Unit for processing and transmission.

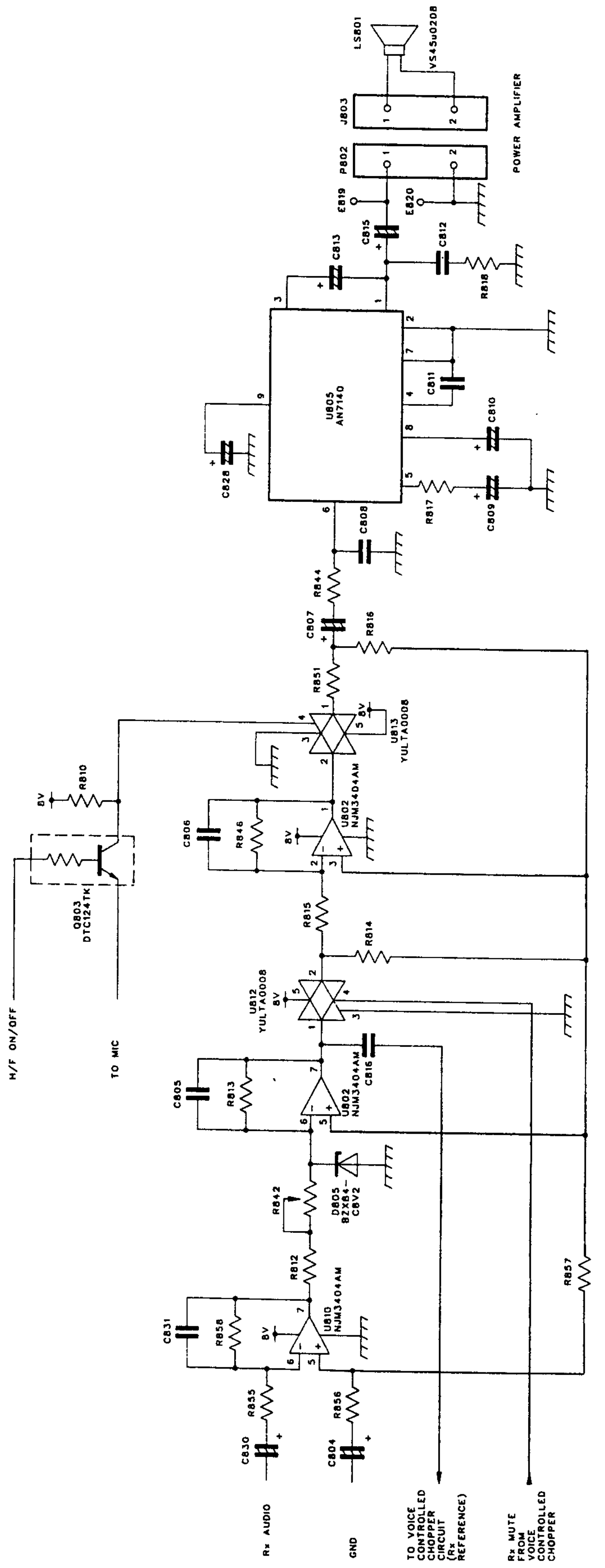

LS801
VS45u020B
J803
P802
POWER AMPLIFIER
E819
E820
C815
C813
C812
R818
U805
AN7140
C811
C810
C828
C809
R817
C808
R844
C807
R816
R851
U813
YULTA0008
8V
R810
Q803
DTC124TK
C806
R846
U802
NJM3404AM
R815
R814
U812
YULTA0008
H/F ON/OFF
TO MIC
C805
R813
C816
D805
BZX84-C8V2
R842
R812
U810
NJM3404AM
C831
R858
R857
R855
R856
C830
C804
Rx AUDIO
GND
TO VOICE CONTROLLED CHOPPER CIRCUIT (Rx REFERENCE)
Rx MUTE FROM VOICE CONTROLLED CHOPPER

Figure 3.9 Rx Audio Circuit

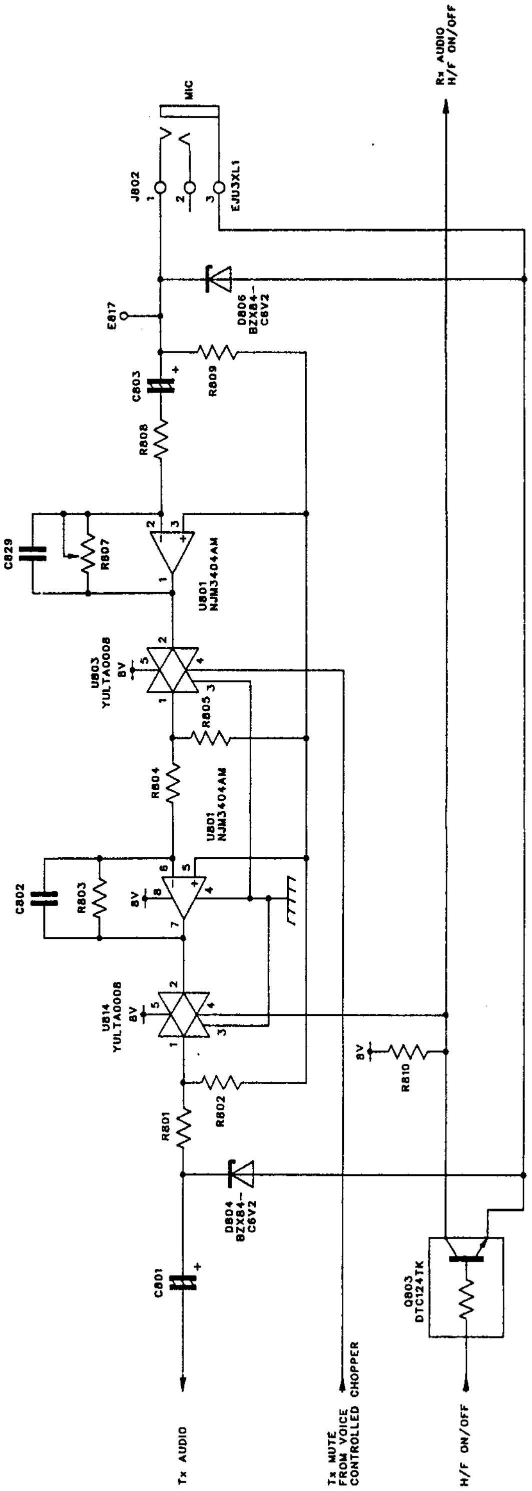

Rx AUDIO
H/F ON/OFF
MIC
J802
1
2
3
EJU3XL1
E817
D806
BZX84-
C6V2
C803
R809
R808
C829
R807
U801
NJM3404AM
U803
YULTA0008
8V
R805
R804
U801
NJM3404AM
C802
R803
8V
U814
YULTA0008
8V
8V
R810
R801
R802
D804
BZX84-
C6V2
C801
Q803
DTC124TK
Tx AUDIO
Tx MUTE
FROM VOICE
CONTROLLED CHOPPER
H/F ON/OFF

Figure 3.10 Tx Audio Circuit

3.4.4 VOICE CONTROLLED CHOPPER CIRCUIT (Figure 3.13)

If the Rx AUDIO and Tx AUDIO signals are simultaneously active, feedback/howling may occur. In order to avoid this problem the two audio lines (Rx and Tx) are chopped such that only one line is active at any given time. Analogue switches (U803), (U812) are used to mute the Rx and Tx AUDIO lines under control of two chopper control pulses, which are inverted with respect to each other. The chopper control pulses are generated by pulse-width modulating a pulse train with a DC reference signal, derived from the Rx AUDIO line. It should be noted that the chopping frequency is such that the action of successively muting the Rx and Tx AUDIO lines is undetectable to the User.

A 555 timer (U807) provides a 21.6 kHz pulse train, which is split to provide a Tx MUTE control pulse and an Rx MUTE control pulse. The Rx MUTE control pulse is inverted by Q807, resulting in a 180° phase shift with respect to the Tx MUTE control pulse.

Pulse shaping on the two pulse trains is required to enable pulse-width modulation. This is achieved using transistor/RC networks; Q808, R838, C822 for the Rx MUTE control pulse. The resultant waveforms remain mutually inverted to each other.

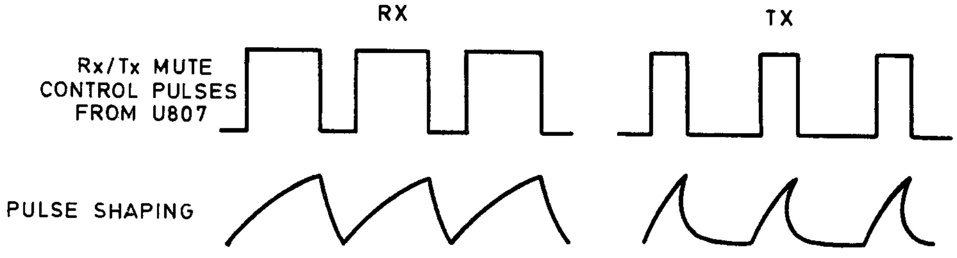


Figure 3.11 Rx/Tx Audio Control Pulses - Shaping

Pulse-width modulation of the control pulses is performed with respect to the Rx AUDIO signal, since this takes priority over the Tx AUDIO signal.

As previously mentioned the Rx AUDIO line is tapped following the volume adjustment/ amplification stage (R842, U802) to obtain a DC level representative of the Rx AUDIO level. The DC level varies in proportion to the Rx MUTE level.

The pulse-width modulation of the Rx/Tx MUTE control pulses, with respect to the Rx AUDIO reference, is performed using 2 comparators (U806). The result is two chopping pulse trains, with 180° phase shift.

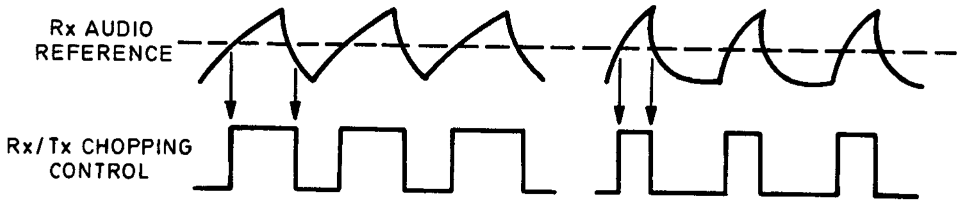


Figure 3.12 Rx/Tx Chopping Control

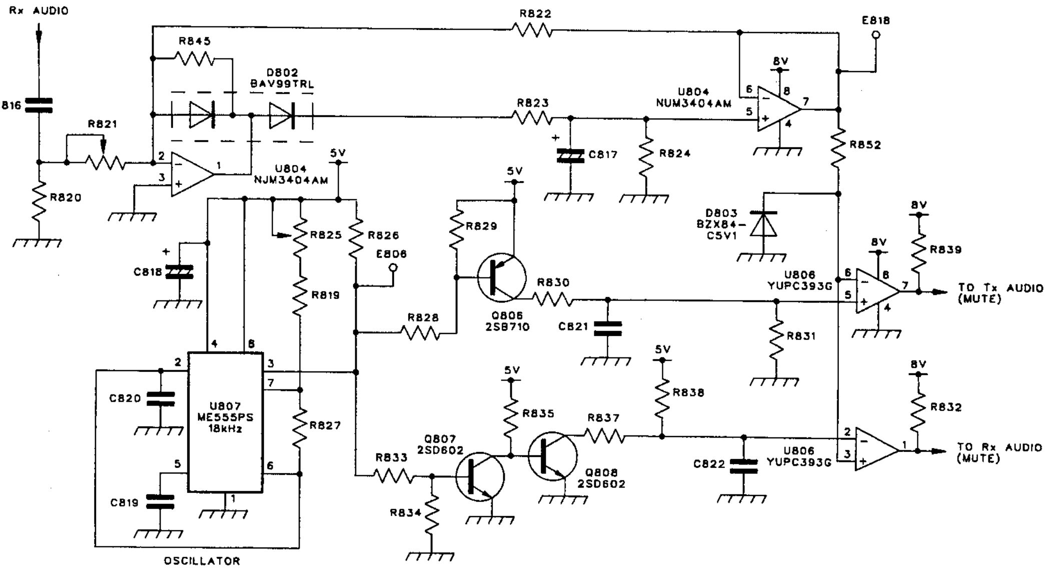

Rx AUDIO
R822
E818
R845
D802
BAV99TRL
R823
U804
NUM3404AM
8V
6
8
7
5
4
C816
R821
2
3
1
U804
NJM3404AM
5V
C817
R824
R852
R820
5V
R829
D803
BZX84-
C5V1
C818
R825
R826
E806
R819
8V
R839
8V
U806
YUPC393G
6
5
8
7
4
TO Tx AUDIO
(MUTE)
R830
R828
Q806
2SB710
C821
R831
5V
4
8
2
3
7
U807
ME555PS
18kHz
C820
R827
6
5
1
C819
5V
R835
R837
R838
Q807
2SD602
R833
Q808
2SD602
R834
C822
U806
YUPC393G
2
3
1
8V
R832
TO Rx AUDIO
(MUTE)
OSCILLATOR

Figure 3.13 Voice Controlled Chopper Circuit

As the DC level shifts, the mark/space ratio of the chopping pulses alters. This effectively changes the mute duration of the Rx/Tx signal lines, eliminating the possibility of feedback/howling.

3.4.5 RECEIVE AUDIO LEVEL

Receive audio line loss and transmit audio line loss change according to the receive audio level. Total loop loss (sum of receive audio line loss and transmit audio line loss) is always constant as shown in Figure 3.14 below.

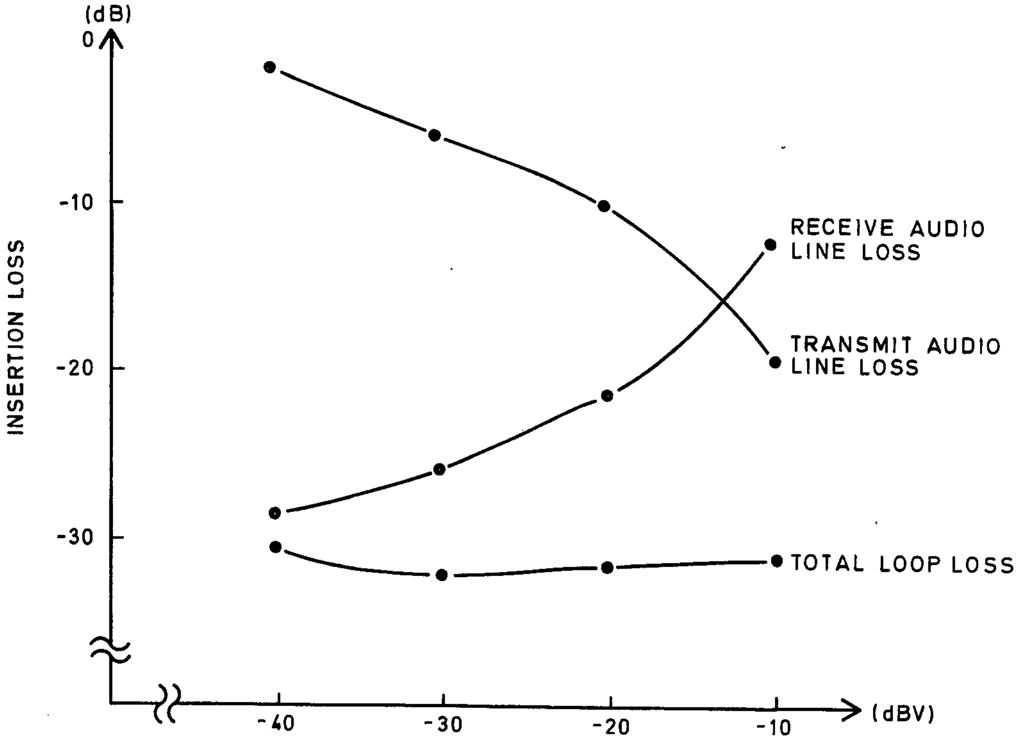


Figure 3.14 Receive Audio Level

3.4.6 MICROPHONE UNIT (ELECTRIC CONDENSER TYPE)

The Microphone Unit has a unidirectional pickup characteristic and converts the User's voice into analogue signals (Tx AUDIO).

3.4.7 HANDSFREE INTERFACE

The Handsfree Cradle Unit incorporates the main interface connectors, J801 and J804, shown in Figure 3.15 below.

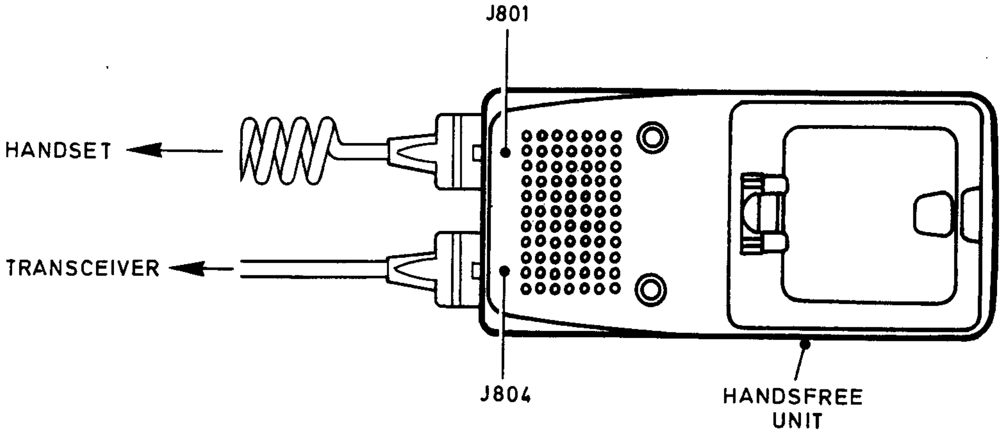


Figure 3.15 Handsfree Cradle Connections

Detailed information of the pins/signals of each connector is provided in Tables 3.9 and 3.10, as listed below:

(1) Table 3.9 Connector J804 - Handsfree/Interconnecting Cable Interface.

(2) Table 3.10 Connector J801 - Handsfree/Handset Interface.

Table 3.9 Connector J804 - Handsfree/Interconnecting Cable Interface

CONNECTOR PIN ASSIGNMENT	SIGNAL	DESCRIPTION
1	SERIAL FORWARD LINE	Output Data to Handset and Data Adapter. Output Level: High (Open Circuit), Low 1.13 V max at Io = 2.5 mA
2	CU POWER	Non-switched DC Power for Handset and Handsfree Unit (500 mA max)
3	POWER ON/OFF	Power Sense Signal from Handset. Power On: 0.40 V max at Io = -0.5 mA, Power Off: Open Circuit
4	POWER KEY STATE	Power Control; Signal from Handset. High: Open Circuit, Low:1.0 V at Io = -0.51 mA
5	SERIAL REVERSE LINE	Input Data from Handset and Data Adapter. Input Level High : Open Circuit, Low 0.8V max at Io = -0.15 mA
6	GND	Connected to Rx AUDIO GND/Logic GND in Handset and Handsfree
7	Rx AUDIO	Nominal Rx AUDIO Voltage Gain of H/F Cradle = 7 dB. Input of 20 dB on J804 Pin 7, Output at P802 Pin 1 = -13 dBV.
8	Tx AUDIO	Nominal Tx AUDIO Voltage Gain of H/F Cradle = 44 dB. Input of -53 dBV on J802 Pin 1, Output at J804 Pin 8 = -9 dBV
9	EXTSIMRST	SIM Card Reset Signal, 0-5 V Active Low
10	EXTSIMIO	SIM Card Input/Output Data
11	EXTSIM DIR	Controls direction of I/O data. High = Data from H/S, Low = Data to H/S
12	EXTSIM	SIM Card Detect. Low = Card In, High = Card Out
13	SIMID	TCVR selects either internal or external SIM. Low = Ext SIM, High = Int SIM
14	H/F ON/OFF	Audio Mute Switch Signal Output for Handsfree Unit. High: Handsfree Audio Mute (3.6 V min at Io = 1.6 mA), Low: Handsfree Audio Unmute (0.5 V max at Io = 0.1 mA)
15	H/F ENABLE	Control Input from Handsfree. Low: Handsfree Enable (0.8 V max Io = 0.5 mA), High: Handsfree Disable (Open Circuit)
16	LOGIC POWER	Power Control Signal to Handsfree. High: Handsfree Power On (4.0 V min at Io = 1.0 mA), Low; Handsfree Power Off (Open Circuit)

Table 3.10 Connector J801 - Handsfree/Handset Interface

CONNECTOR PIN ASSIGNMENT	SIGNAL	DESCRIPTION
1	SERIAL FORWARD LINE	Output Data to Handset and Data Adapter Output Level: (Open Circuit), Low 1.13 V max at Io = 2.5 mA
2	CU POWER	Non-switched DC Power for Handset and Handsfree Unit (500 mA max)
3	POWER ON/OFF	Power Sense Signal from Handset. Power On: 0.40 V max at Io = -0.5 mA, Power Off: Open Circuit
4	POWER KEY STATE	Power Control Signal from Handset. High: Open Circuit, Low: 1.0 V at Io = -0.15 mA
5	SERIAL REVERSE LINE	Input Data from Handset and Data Adapter. Input Level High: Open Circuit, Low: 0.8 V max at Io = -0.15 mA
6	GND	Connected to Rx AUDIO GND/Logic GND in Handset and Handsfree
7	Rx AUDIO	Nominal Rx AUDIO Voltage Gain of Cradle = 7 dB. Input - 20 dBV on J801 Pin 7, Output at P802 Pin 1 = -13 dBV
8	Tx AUDIO	Nominal Tx AUDIO Voltage Gain of Cradle = 44 dB. Input -53 dBV on J802 Pin 1, Output at J801 Pin 8 = -9 dBV
CONNECTOR COVER (CASE)	SHIELD GND	Connected to Tx AUDIO GND in Handset and Handsfree
9	EXTSIMRST	SIM Card Reset Signal, 0-5 V Active Low
10	EXTSIMIO	SIM Card Input/Output Data
11	EXTSIMDIR	If Low then TCVR Sends Data on EXTSIMIO. If High then SIM Card Sends Data on EXTSIMIO
12	EXTSIM	SIM Card Detect: Low = Card In, High = Card Out
13	SIMID	TCVR CPU acknowledges SIM Card Entry and enables it using this line

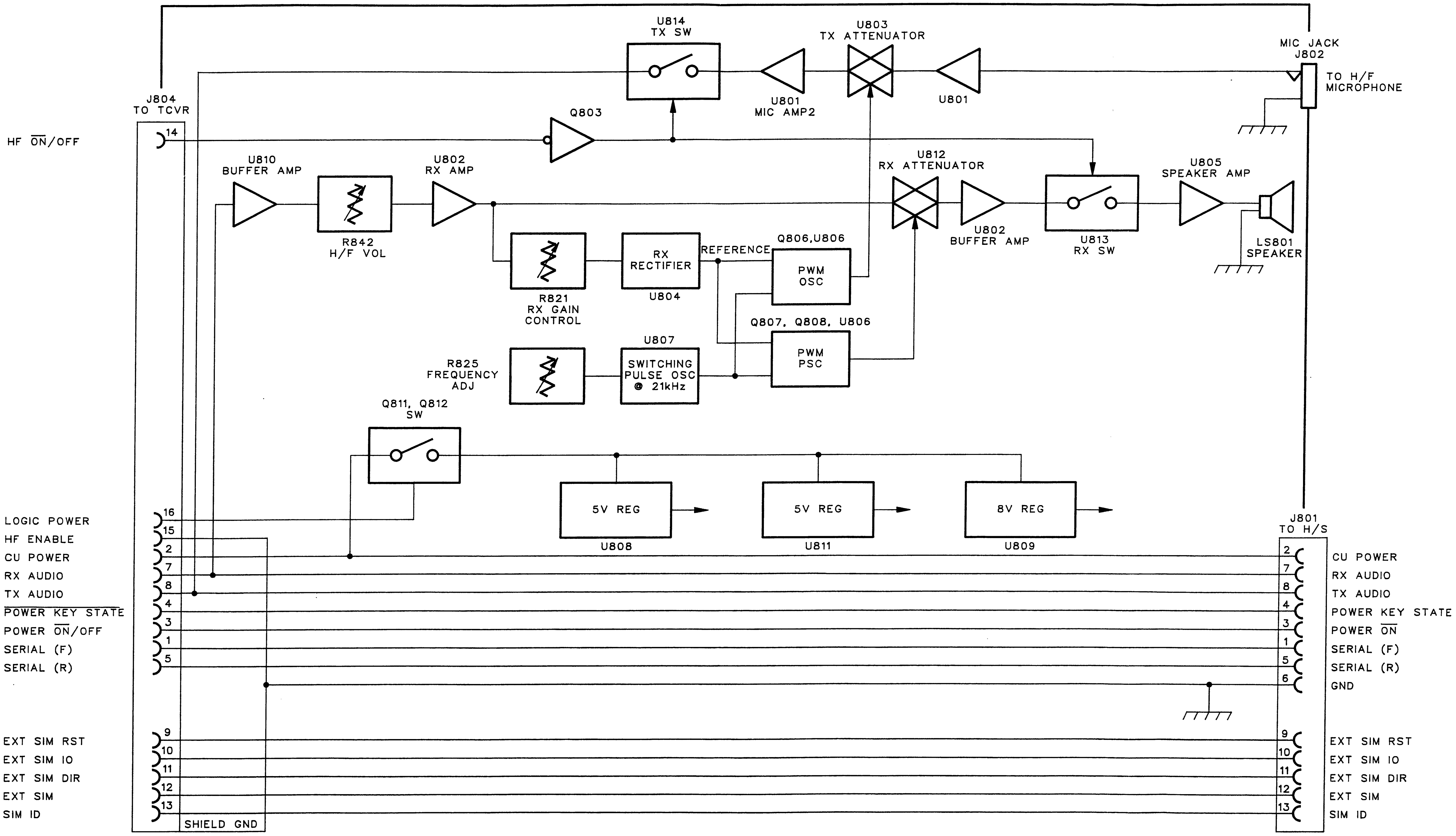
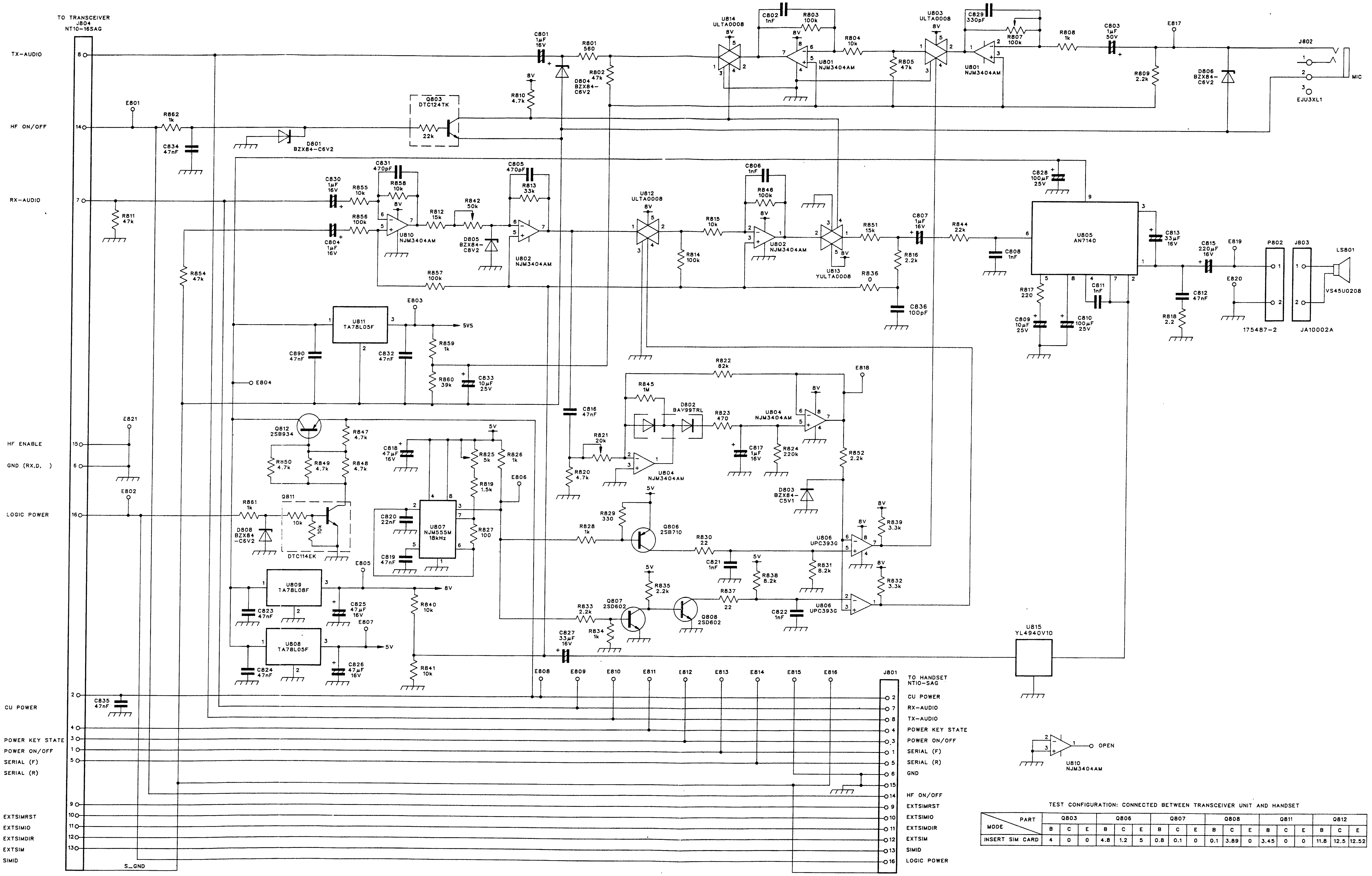

U814
TX SW
U803
TX ATTENUATOR
MIC JACK
J802
TO H/F
MICROPHONE
J804
TO TCVR
U801
MIC AMP2
U801
Q803
HF ON/OFF
14
U810
BUFFER AMP
U802
RX AMP
U812
RX ATTENUATOR
U805
SPEAKER AMP
R842
H/F VOL
U802
BUFFER AMP
U813
RX SW
LS801
SPEAKER
RX
RECTIFIER
REFERENCE
Q806,U806
PWM
OSC
R821
RX GAIN
CONTROL
U804
Q807, Q808, U806
U807
PWM
PSC
R825
FREQUENCY
ADJ
SWITCHING
PULSE OSC
@ 21kHz
Q811, Q812
SW
5V REG
5V REG
8V REG
U808
U811
U809
J801
TO H/S
LOGIC POWER
HF ENABLE
CU POWER
RX AUDIO
TX AUDIO
POWER KEY STATE
POWER ON/OFF
SERIAL (F)
SERIAL (R)
16
15
2
7
8
4
3
1
5
CU POWER
RX AUDIO
TX AUDIO
POWER KEY STATE
POWER ON
SERIAL (F)
SERIAL (R)
GND
2
7
8
4
3
1
5
6
EXT SIM RST
EXT SIM IO
EXT SIM DIR
EXT SIM
SIM ID
9
10
11
12
13
SHIELD GND
EXT SIM RST
EXT SIM IO
EXT SIM DIR
EXT SIM
SIM ID
9
10
11
12
13

Figure 3.16 Handsfree Cradle Unit - Block Diagram


TO TRANSCEIVER
J804
NT10-16SAG
TX-AUDIO
HF ON/OFF
RX-AUDIO
HF ENABLE
GND (RX,D,)
LOGIC POWER
CU POWER
POWER KEY STATE
POWER ON/OFF
SERIAL (F)
SERIAL (R)
EXTSIMRST
EXTSIMIO
EXTSIMDIR
EXTSIM
SIMID
S_GND
E801
E802
E803
E804
E805
E806
E807
E808
E809
E810
E811
E812
E813
E814
E815
E816
E817
E818
E819
E820
E821
R862 1k
C834 47nF
D801 BZX84-C6V2
Q803 DTC124TK
22k
C801 1μF 16V
R801 560
R802 47k
D804 BZX84-C6V2
R810 4.7k
8V
U814 ULTA0008
C802 1nF
R803 100k
U801 NJM3404AM
R804 10k
R805 47k
U803 ULTA0008
C829 330pF
R807 100k
R808 1k
C803 1μF 50V
R809 2.2k
D806 BZX84-C6V2
J802
MIC
EJU3XL1
R811 47k
C830 1μF 16V
C831 470pF
R855 10k
R858 10k
R856 100k
C804 1μF 16V
U810 NJM3404AM
R812 15k
R842 50k
D805 BZX84-C8V2
C805 470pF
R813 33k
U802 NJM3404AM
R857 100k
R854 47k
U812 ULTA0008
R815 10k
R814 100k
C806 1nF
R846 100k
U813 YULTA0008
R851 15k
R836 0
C807 1μF 16V
R816 2.2k
C836 100pF
R844 22k
C808 1nF
C828 100μF 25V
U805 AN7140
R817 220
C809 10μF 25V
C810 100μF 25V
C811 1nF
C813 33μF 16V
C815 220μF 16V
C812 47nF
R818 2.2
P802
J803
LS801
VS45U0208
175487-2
JA10002A
U811 TA78L05F
5VS
C890 47nF
C832 47nF
R859 1k
R860 39k
C833 10μF 25V
C816 47nF
R822 82k
R845 1M
D802 BAV99TRL
R823 470
U804 NJM3404AM
R821 20k
R820 4.7k
C817 1μF 16V
R824 220k
R852 2.2k
D803 BZX84-C5V1
Q812 2SB934
R847 4.7k
R850 4.7k
R849 4.7k
R848 4.7k
C818 47μF 16V
5V
R825 5k
R826 1k
R819 1.5k
U807 NJM555M 18kHz
C820 22nF
C819 47nF
R827 100
Q811
R861 1k
D808 BZX84-C6V2
DTC114EK
10k
R829 330
R828 1k
Q806 2SB710
R830 22
C821 1nF
R838 8.2k
R831 8.2k
U806 UPC393G
R839 3.3k
R832 3.3k
R835 2.2k
R837 22
C822 1nF
Q807 2SD602
Q808 2SD602
R833 2.2k
R834 1k
C827 33μF 16V
U809 TA78L08F
C823 47nF
C825 47μF 16V
8V
R840 10k
U808 TA78L05F
C824 47nF
C826 47μF 16V
R841 10k
C835 47nF
U815 YL494OV10
J801
TO HANDSET
NT10-SAG
CU POWER
RX-AUDIO
TX-AUDIO
POWER KEY STATE
POWER ON/OFF
SERIAL (F)
SERIAL (R)
GND
HF ON/OFF
EXTSIMRST
EXTSIMIO
EXTSIMDIR
EXTSIM
SIMID
LOGIC POWER
OPEN
U810 NJM3404AM

TEST CONFIGURATION: CONNECTED BETWEEN TRANSCEIVER UNIT AND HANDSET

MODE \ PART	Q803			Q806			Q807			Q808			Q811			Q812		
	B	C	E	B	C	E	B	C	E	B	C	E	B	C	E	B	C	E
INSERT SIM CARD	4	0	0	4.8	1.2	5	0.8	0.1	0	0.1	3.89	0	3.45	0	0	11.8	12.5	12.52

Figure 3.17 Handsfree Cradle Unit - Circuit Diagram

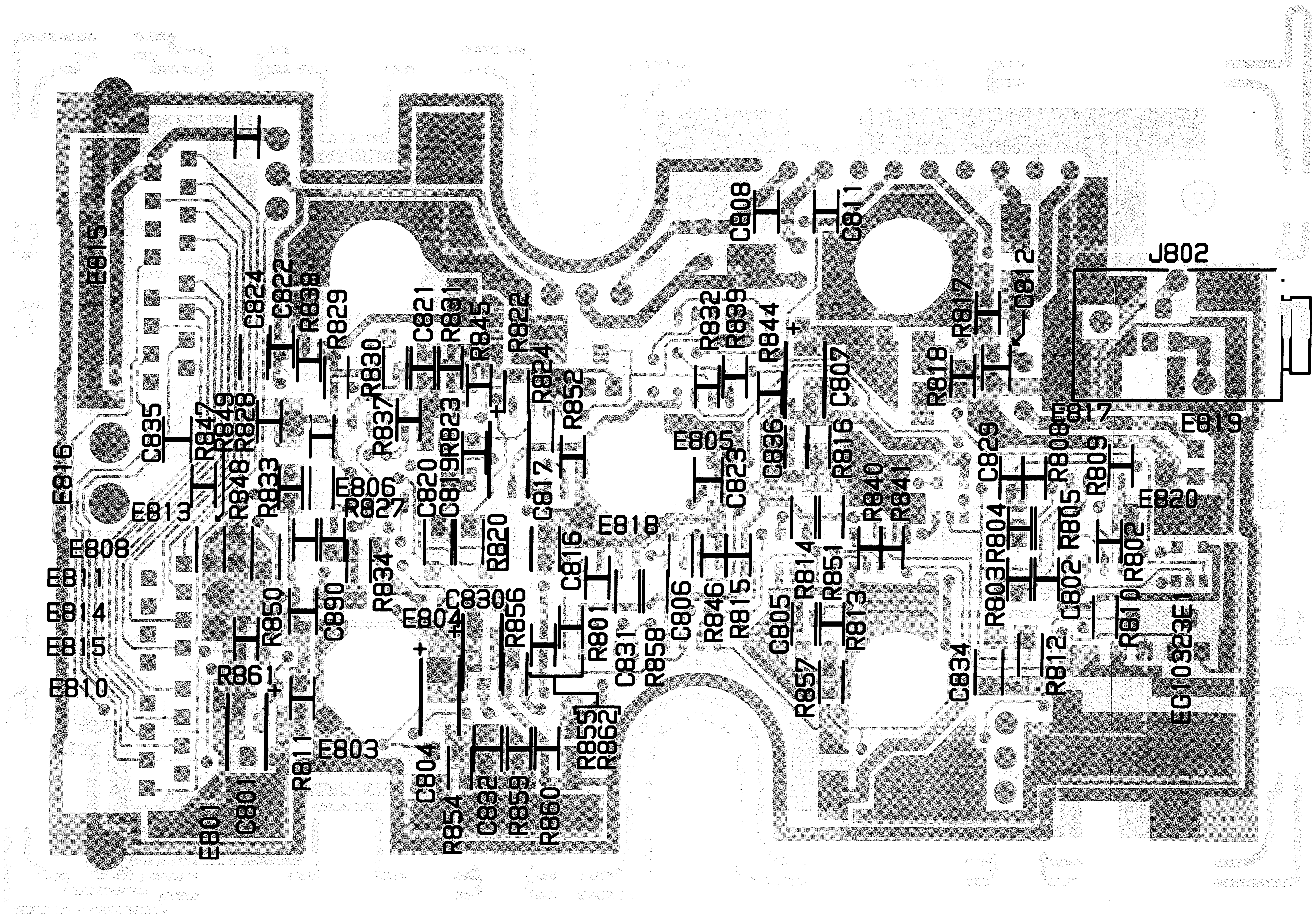

E815
C824
C822
R838
R829
C821
R831
R845
R822
C808
C811
J802
R817
C812
R818
R830
R832
R839
R844
C807
R824
R852
C835
R847
R849
R828
R837
R823
E805
C836
R816
E817
E819
E816
R848
R833
E806
R827
C820
C819
C817
C823
R840
R841
C829
R808
R809
E813
E820
E818
R820
C816
R804
R805
R802
E808
R834
R814
R851
R803
C802
E811
C890
C830
R856
C806
R846
R815
C805
R813
R810
EG10923E1
E814
R850
E804
R801
R812
C834
E815
R861
C831
R858
R857
E810
E803
R855
R862
R811
C804
C801
E801
R854
C832
R859
R860

Figure 3.18 Handsfree Cradle Unit - PCB Component Layout (Topside)

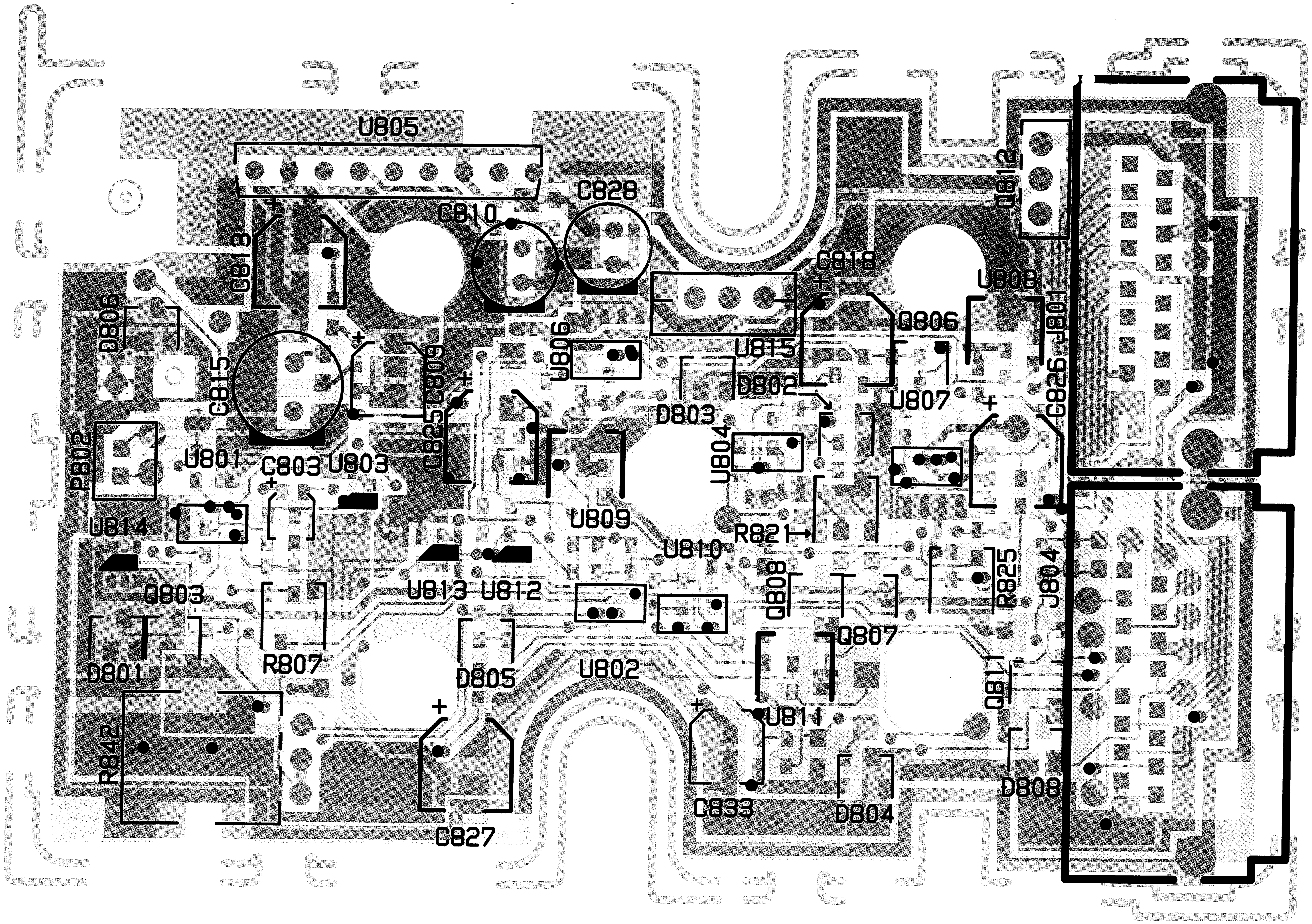

U805
C828
C810
C813
C818
U808
Q812
J801
D806
C815
C809
U806
U815
Q806
C826
D802
U807
D803
P802
U801
C803
U803
C825
U804
U814
U809
R821
U810
Q803
U813
U812
Q808
R825
J804
R807
Q807
D801
D805
U802
Q811
R842
U811
D808
C833
D804
C827

Figure 3.19 Handsfree Cradle Unit - PCB Component Layout (Bottomside)

3.5 TRANSCEIVER UNIT

3.5.1 GENERAL

Technical information for the Transceiver Unit EB-2803 is limited to a block diagram (given at Figure 3.20), and details of Transceiver board test points. A full technical description is provided in the associated Technical Manual.

3.5.2 TRANSCEIVER BOARD TEST POINTS

Transceiver board test points are listed in Table 3.11 below, together with signal details and associated devices.

Table 3.11 Transceiver Board Test Points

TEST POINT NO.	SIGNAL	ASSOCIATED DEVICES
1	PA Power	PSU
2	ADIN	ADC
3	M (2)	CMOS DIGI
4	Div Ack	CMOS DIGI
5	AD (0)	Tim, CIO
6	AD (4)	Tim, CIO
7	Power on Reset Bar	Tim, CIO, SP, CIE, EQ, CMOS, Dial
8	ANACS	CIO
9	NOT AVAILABLE	
10	M (0)	CMOS DIGI
11	M (4)	CMOS DIGI
12	INLOCK	CMOS DIGI
13	AD (2)	TIM, CIO DIGI
14	AD (6)	TIM, CIO DIGI
15	ID NOT WRITE	TIM, CIO, CPU DIGI
16	ACQWIN	TIM
17	ADRFF	ADC
18	RF DIS	EQ, CMOS, DIGI
19	RF OFF	TIM
20	M (3)	CMOS DIGI
21	DIV CLK	CMOS DIGI
22	AD (1)	TIM, CIO
23	AD (5)	TIM, CIO
24	M (1)	CMOS DIGI
25	M (5)	CMOS DIGI
26	ANA INT	CIO
27	AD (3)	TIM, CIO
28	AD (7)	TIM, CIO
29	ID NOT READ	TIM, CIO
30	LOG DET OFF	TIM
31	ALE BAR	TIM, CIO, SP, CIE
32	MON WIN	TIM
33	Tx WIN	TIM
34	PA GATING	TIM
35	13 MHz SYSCLK	TIM, CIO, CPU, CIE, SP, EQ, CMOS, DIGI, +RF
36	+5 V	PSV

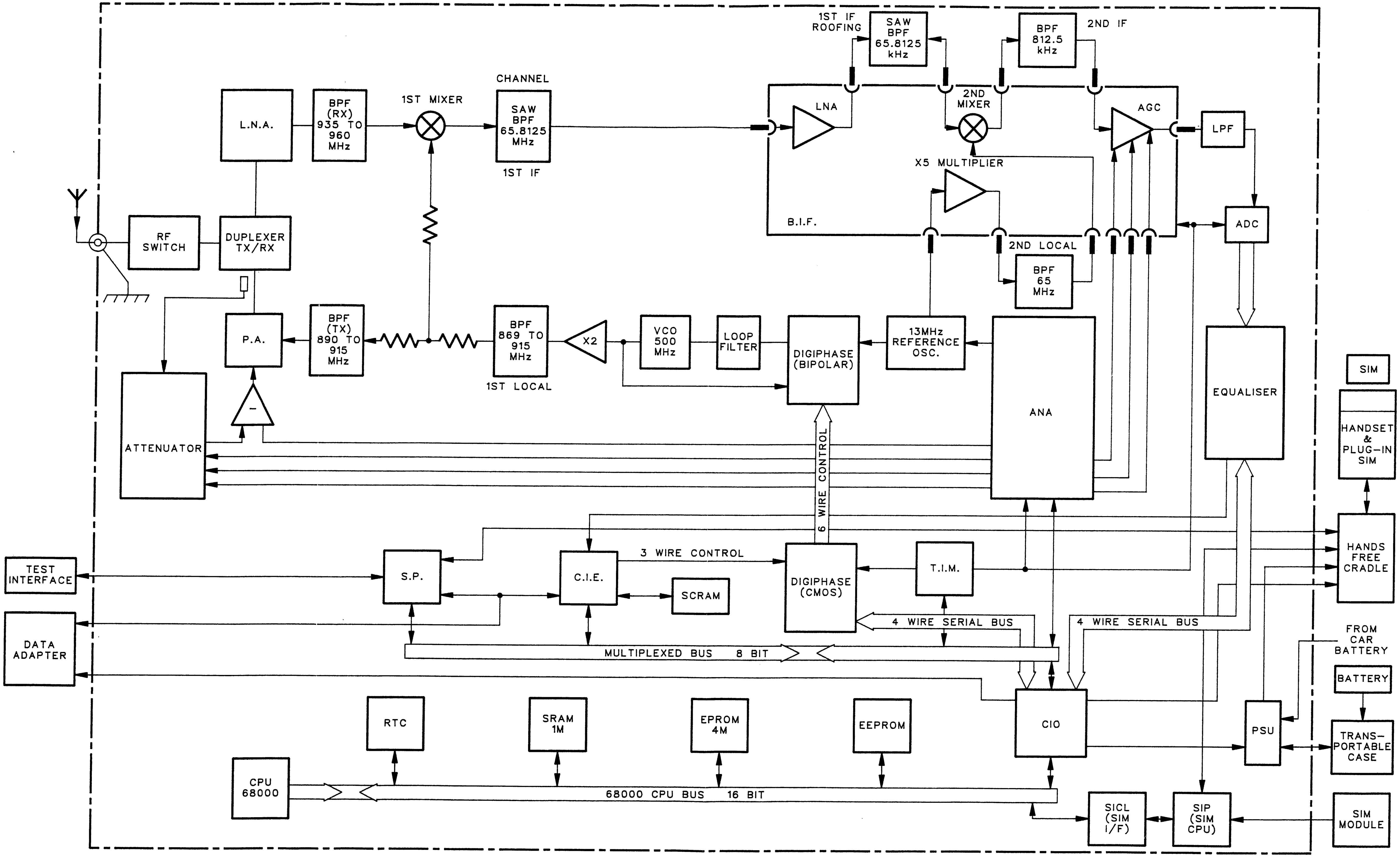

1ST IF ROOFING
SAW BPF 65.8125 kHz
BPF 812.5 kHz
2ND IF
CHANNEL
L.N.A.
BPF (RX) 935 TO 960 MHz
1ST MIXER
SAW BPF 65.8125 MHz
1ST IF
LNA
2ND MIXER
AGC
LPF
X5 MULTIPLIER
B.I.F.
2ND LOCAL
BPF 65 MHz
ADC
RF SWITCH
DUPLEXER TX/RX
P.A.
BPF (TX) 890 TO 915 MHz
BPF 869 TO 915 MHz
1ST LOCAL
X2
VCO 500 MHz
LOOP FILTER
DIGIPHASE (BIPOLAR)
13MHz REFERENCE OSC.
ANA
EQUALISER
SIM
HANDSET & PLUG-IN SIM
ATTENUATOR
6 WIRE CONTROL
TEST INTERFACE
S.P.
C.I.E.
3 WIRE CONTROL
SCRAM
DIGIPHASE (CMOS)
T.I.M.
HANDS FREE CRADLE
DATA ADAPTER
4 WIRE SERIAL BUS
4 WIRE SERIAL BUS
MULTIPLEXED BUS 8 BIT
FROM CAR BATTERY
BATTERY
RTC
SRAM 1M
EPROM 4M
EEPROM
CIO
PSU
TRANS-PORTABLE CASE
CPU 68000
68000 CPU BUS 16 BIT
SICL (SIM I/F)
SIP (SIM CPU)
SIM MODULE

Figure 3.20Transceiver Unit - Block Diagram

3.6 TRANSPORTABLE CASE UNIT

3.6.1 GENERAL

The following is a technical description for the Transportable Case Unit EB-J03468. A block diagram of the Transportable Case Unit is provided at Figure 3.21 below, with a full circuit diagram and PCB component layout diagrams given at Figures 3.25 to 3.27.

The principal functional blocks within the Transportable Unit are:

(1) Start Circuit and DC Switch.

(2) 10 Hour Charge Timer.

(3) DC/DC Converter.

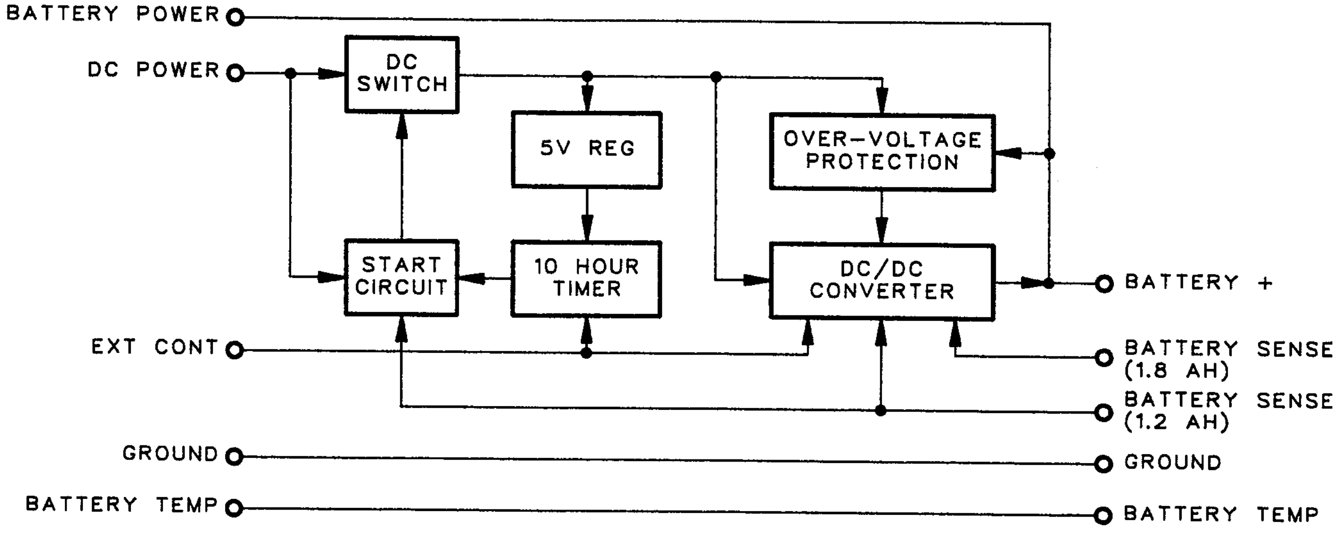

BATTERY POWER
DC POWER
DC SWITCH
5V REG
OVER-VOLTAGE PROTECTION
START CIRCUIT
10 HOUR TIMER
DC/DC CONVERTER
BATTERY +
EXT CONT
BATTERY SENSE (1.8 AH)
BATTERY SENSE (1.2 AH)
GROUND
GROUND
BATTERY TEMP
BATTERY TEMP

Figure 3.21 Transportable Case Unit - Block Diagram

When power is applied to the Transportable Case Unit circuit, the DC Switch is turned on automatically, so starting the 10 Hour Timer. The DC/DC converter now proceeds to charge the battery until the 10 hour charge time elapses, at which point the charge circuit is switched off.

The Start Circuit is a 'one shot' circuit that turns on the DC Switch long enough for the 10 Hour Timer to reset itself and so hold the DC Switch turned on.

Battery voltage and charge voltage output are continually monitored for over-voltage.

3.6.2 START CIRCUIT AND DC SWITCH (Figure 3.22)

The Start circuit and DC Switch circuit are reproduced in Figure 3.22 below.

At initial application of DC power from the Transceiver Unit, Q501.1 is turned off whilst C501 is charging, and so Q502.1 immediately turns on the DC Switch Q503. With Q503 switched on, the 5 V Regulator U501 supplies +5 V to counter U502 which consequently generates a RESET signal on pin 3. This signal is low and is used to turn off Q501.2, which in turn switches on Q502.2. Thus the DC Switch is turned on by both Q502.1 and Q502.2 at this time. When C501 is sufficiently charged, Q501.1

switches on, and this turns off Q502.1: the DC Switch is now held turned on by Q502.2 alone. With the DC Switch on, battery charging commences.

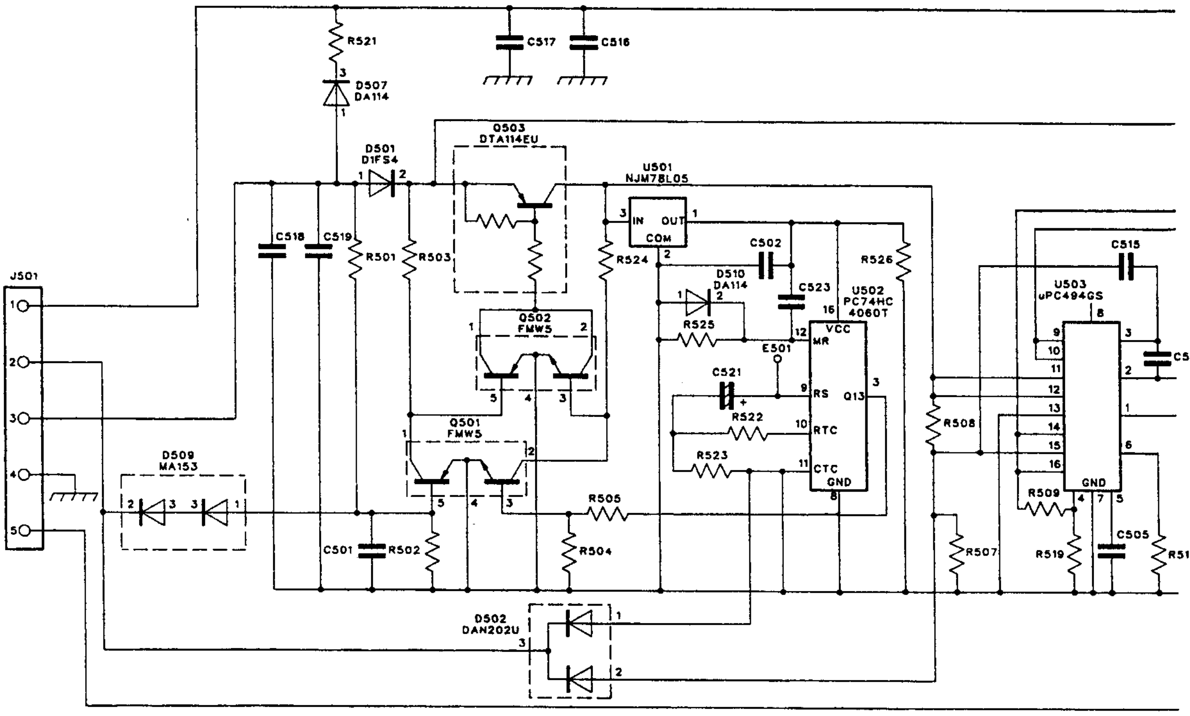

R521
C517
C516
D507
DA114
Q503
DTA114EU
D501
D1FS4
U501
NJM78L05
IN
OUT
COM
C518
C519
R501
R503
R524
C502
R526
D510
DA114
C523
U502
PC74HC
4060T
J501
Q502
FMW5
R525
E501
VCC
MR
C521
RS
Q13
R522
RTC
R523
CTC
GND
Q501
FMW5
D509
MA153
R505
C501
R502
R504
D502
DAN202U
R508
R507
C515
U503
uPC494GS
C506
R509
R519
C505
R511

Figure 3.22 Start Circuit, DC Switch and 10 Hour Timer

3.6.3 10 HOUR CHARGE TIMER (Figure 3.22)

The 10 Hour Charge Timer circuit is reproduced in Figure 3.22 above. Subsequent to initial switch on, the DC Switch (Q503) is held turned on by the RESET signal (low) produced at pin 3 of counter U502, as described in para 3.6.2 above.

Counter U502 contains an internal oscillator, the frequency of which is set to 0.25 Hz (approx) by R522 and C521. When the counter reaches count 8192 (which equates to 10 hours) the RESET signal at U502 pin 3 is removed. At this, Q501.2 turns on, Q502.2 turns off and so the DC Switch Q503 is switched off. With the DC Switch off, battery charging ceases.

3.6.4 DC/DC CONVERTER - CONSTANT CURRENT CHARGING (Figure 3.23)

The DC/DC Converter circuit is reproduced in Figure 3.23.

The battery charging voltage is derived from Transformer T501, via rectifier D506, as follows. When the DC Switch Q503 is turned on, U503 produces a squarewave of about 80 kHz at pin 10, and this waveform is used to drive Q504 on and off. The output from Q504 drives Q505 which controls the on/off time of transformer T501. Thus the battery charging voltage output comprises a series of voltage pulses, supplied via transformer T501.

The ratio of transformer T501 is 1:18. The maximum allowable output to the battery is 18 V ± 1.5 V, and this is controlled by zener diodes D503/D504.

The battery charge rate is controlled by U503 which can vary the mark/space ratio of the voltage pulses sent to the battery, i.e. increasing the mark time decreases the charge time, see example shown in Figure 3.24.

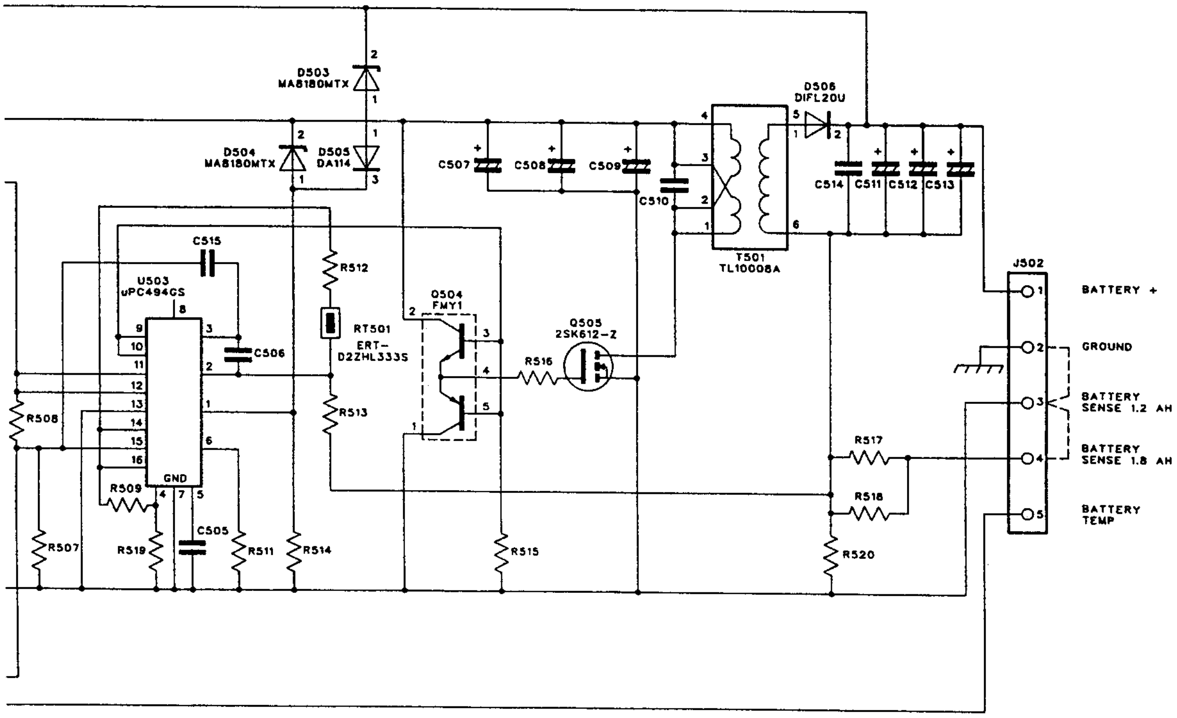
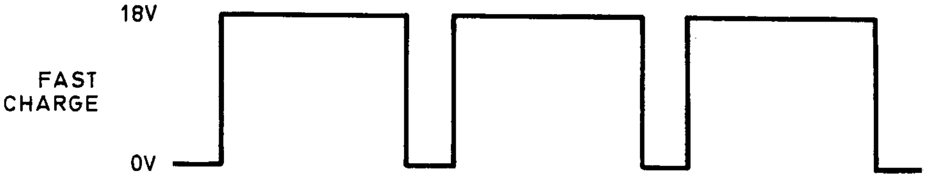
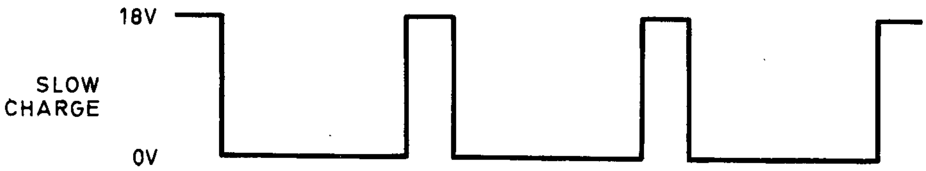

D503
MA8180MTX
D504
MA8180MTX
D505
DA114
D506
DIFL20U
C507
C508
C509
C510
C514
C511
C512
C513
T501
TL10008A
J502
BATTERY +
GROUND
BATTERY SENSE 1.2 AH
BATTERY SENSE 1.8 AH
BATTERY TEMP
C515
U503
uPC494GS
C506
R512
RT501
ERT-D2ZHL333S
Q504
FMY1
Q505
2SK612-Z
R516
R513
R508
R509
GND
C505
R507
R519
R511
R514
R515
R517
R518
R520

Figure 3.23 DC/DC Converter - Constant Current Charging



(a) Fast Charge (large 'mark')



(b) Slow Charge (large 'space')

Figure 3.24 Battery Charging Voltage Output

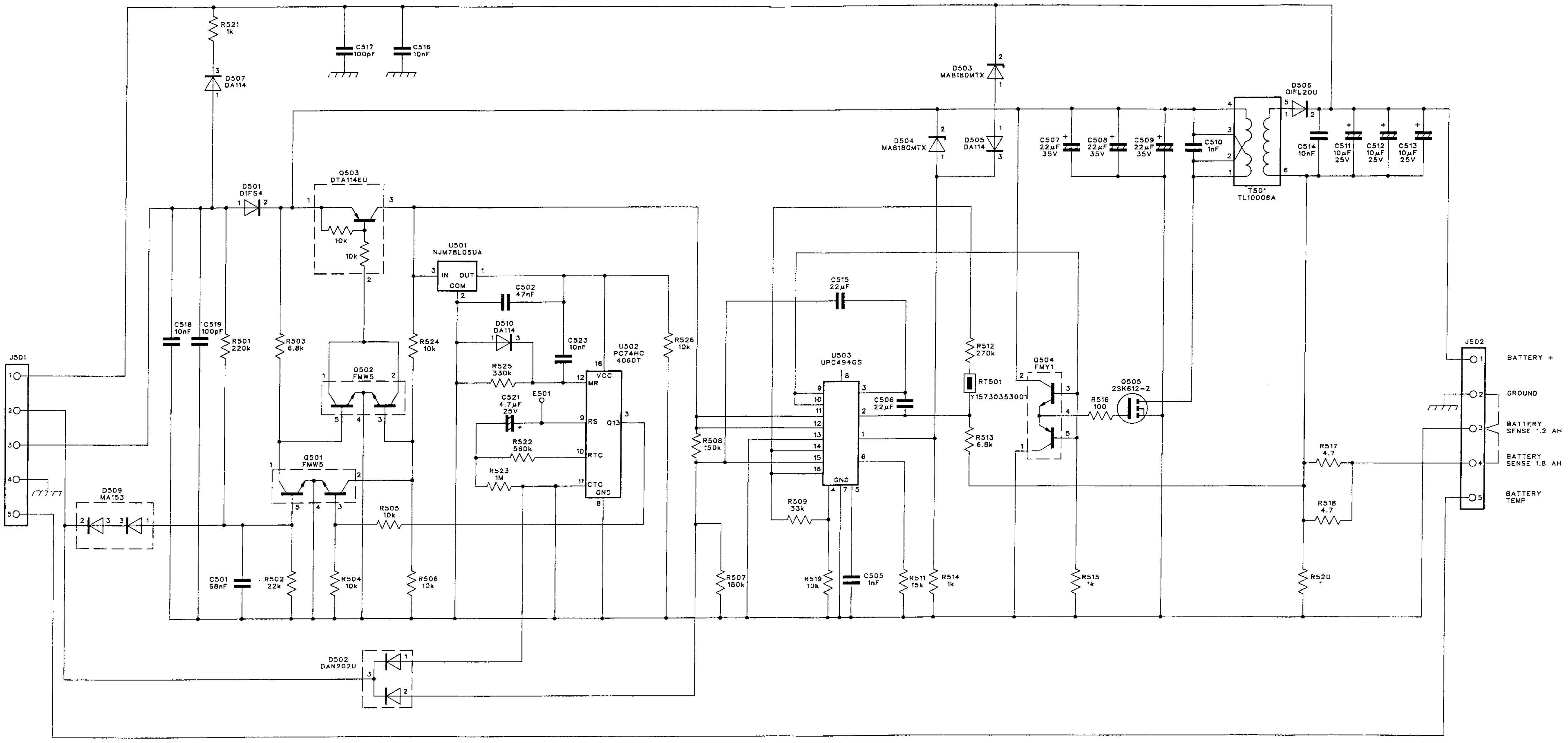
The battery feedback voltage is applied to U503 at pin 2. This is controlled via pins 3 and 4 of J502, which is the return line from the battery, either 1.8 AH or 1.2 AH:

(1) Pin 4 is 1.8 AH.

(2) Pin 3 is 1.2 and 1.8 AH.

The voltage developed across resistors R517, R518 and R520 should be very low, approx 0.1 V, and is proportional to the current being drawn by the battery via pin 1 of J502. This variation appears on pin 2 of U503, and the mark/space ratio of the output of U503 pin 10 is varied accordingly.

U503 pin 14 provides a 5 V reference to set the bias level on pin 2 across R512 and thermister RT501. RT501 monitors ambient temperature. If the ambient temperature increases the voltage on U503 pin 2 increases due to RT501. This continues to a preset level, at which point U503 ceases to generate the charge voltage waveform at pin 10.


R521
1k
C517
100pF
C516
10nF
D507
DA114
D503
MA8180MTX
D504
MA8180MTX
D505
DA114
C507
22µF
35V
C508
22µF
35V
C509
22µF
35V
C510
1nF
D506
DIFL20U
T501
TL10008A
C514
10nF
C511
10µF
25V
C512
10µF
25V
C513
10µF
25V
D501
D1FS4
Q503
DTA114EU
10k
10k
U501
NJM78L05UA
IN
OUT
COM
C502
47nF
C518
10nF
C519
100pF
R501
220k
R503
6.8k
R524
10k
D510
DA114
C523
10nF
U502
PC74HC
4060T
R526
10k
J501
Q502
FMW5
R525
330k
VCC
MR
E501
C521
4.7µF
25V
RS
Q13
R522
560k
RTC
R523
1M
CTC
GND
Q501
FMW5
D509
MA153
R505
10k
C501
68nF
R502
22k
R504
10k
R506
10k
D502
DAN202U
C515
22µF
U503
UPC494GS
C506
22µF
GND
R508
150k
R509
33k
R507
180k
R519
10k
C505
1nF
R511
15k
R514
1k
R512
270k
RT501
Y15730353001
R513
6.8k
Q504
FMY1
Q505
2SK612-Z
R516
100
R515
1k
R517
4.7
R518
4.7
R520
1
J502
BATTERY +
GROUND
BATTERY SENSE 1.2 AH
BATTERY SENSE 1.8 AH
BATTERY TEMP

TEST CONFIGURATION: CONNECTED TO TEST JIG MCST-0005GB01

PART / MODE	Q501					Q502					Q503			Q504					Q505		
	1	2	3	4	5	1	2	3	4	5	1	2	3	1	2	3	4	5	G	D	S
ENABLED	0	0.7	0	0	0.7	0	0	0.7	0	0	0	12.8	12.8	0	12.8	3.8	3.8	3.8	3.8	13	0

Figure 3.25 Transportable Case Unit - Circuit Diagram

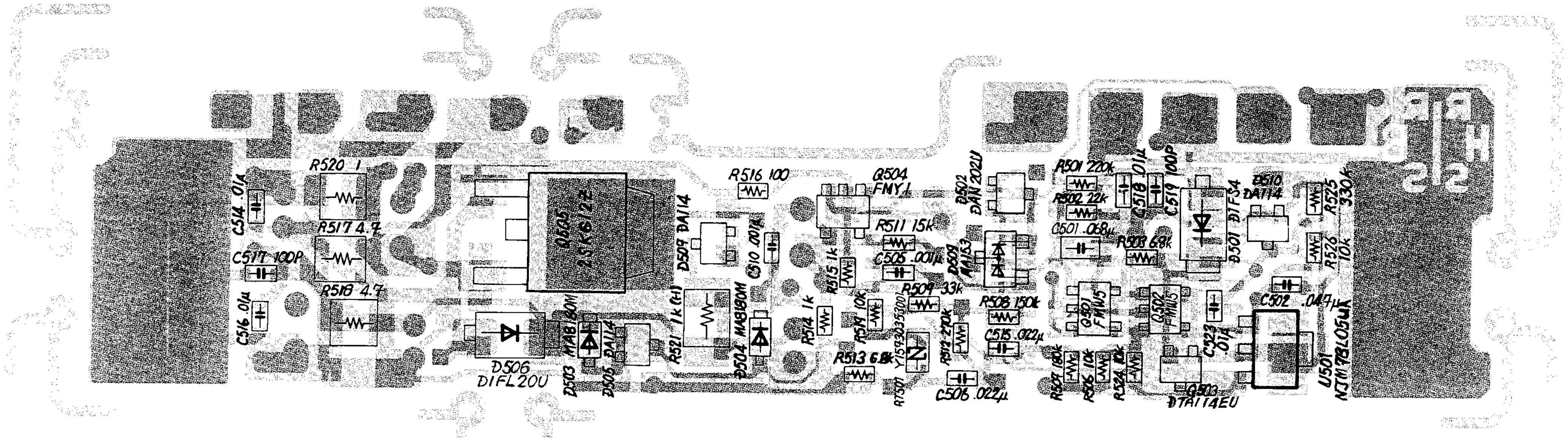

R520 1
C514 .01μ
R517 4.7
C517 100P
R518 4.7
C516 .01μ
Q505 2SK612Z
D506 DIFL20U
D503 MA180M
D505 DA114
D507 DA114
C510 .001μ
R521 1k (H)
D504 MA180M
R516 100
R515 1k
R514 1k
Q504 FMY1
R511 15k
C505 .001μ
R519 10k
R509 33k
R513 6.8k
RT501 Y1593035300
R512 270k
C506 .022μ
D502 DAN202U
D508 MA153
R508 150k
C515 .022μ
R501 220k
R502 22k
C501 .068μ
C518 .01μ
C519 100P
R503 6.8k
Q501 FMW5
Q502 FMW5
R507 180k
R506 10k
R524 10k
D501 D1FS4
D510 DA114
C523 .01μ
Q503 DTA114EU
C502 .047μ
R525 330k
R526 10k
U501 NJM78L05UA

Figure 3.26 Transportable Case Unit - PCB Component Layout (Topside)

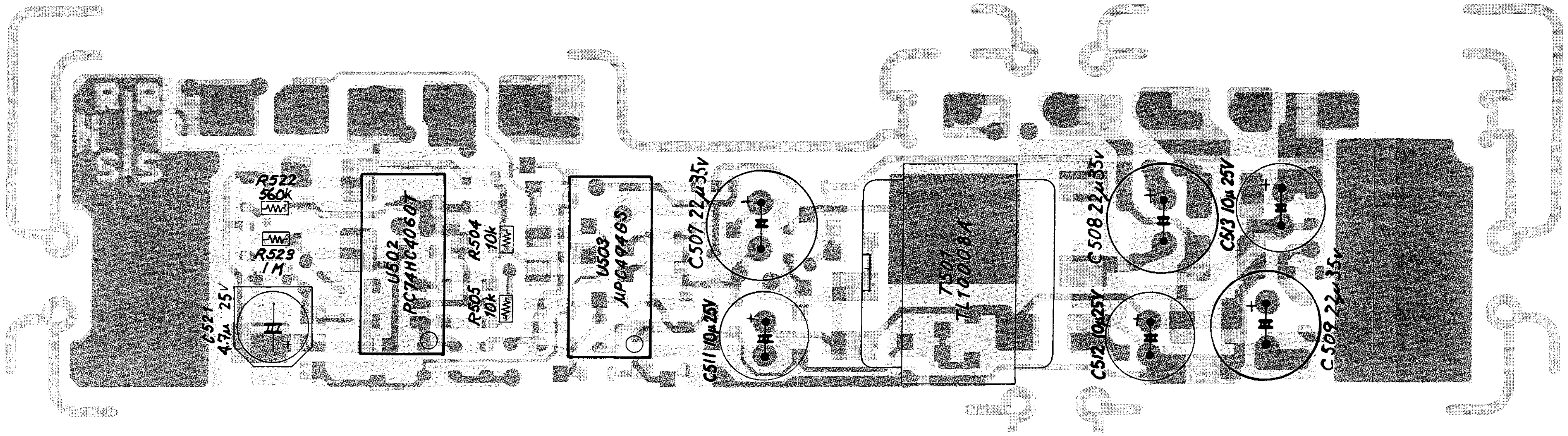

R522
560K
R523
1M
C521
4.7µ 25V
U502
PC74HC4060T
R504
10k
R505
10k
U503
µPC494GS
C507 22µ 35V
C511 10µ 25V
T501
TL10008A
C508 22µ 35V
C512 10µ 25V
C513 10µ 25V
C509 22µ 35V

Figure 3.27 Transportable Case Unit - PCB Component Layout (Bottomside)

4. INSTALLATION GUIDE

4.1 INTRODUCTION

This chapter provides information on unpacking and installing the GSM Mobile Telephone into a vehicle (e.g. car, truck etc).

Caution

Do not install the Transceiver Unit into, or attempt to power the Transportable Unit from, a vehicle (car, truck,etc.) that has a positive ground electrical system.

In addition, a brief troublehsooting guide is provided for faults apparent subsequent to installation.

4.2 UNPACKING

Prior to installing the GSM Mobile Telephone, unpack all the components and ensure that everything necessary is available. Refer to Appendix B for details on packaging.

Visually inspect each component for signs of damage. Provided that no damage is apparent, proceed to install the equipment.

4.3 SITING EQUIPMENT AND WIRING

Basically, installation involves fitting the Transceiver Unit, Handsfree Cradle Unit, Handset Unit, Handsfree Microphone, an Antenna (not suppplied), power supply lead and the various unit interconnecting cables.

Figure 4.1 below shows a typical (recommended) installation, detailing unit and wiring locations. Alternative installations are shown in Figure 4.2.

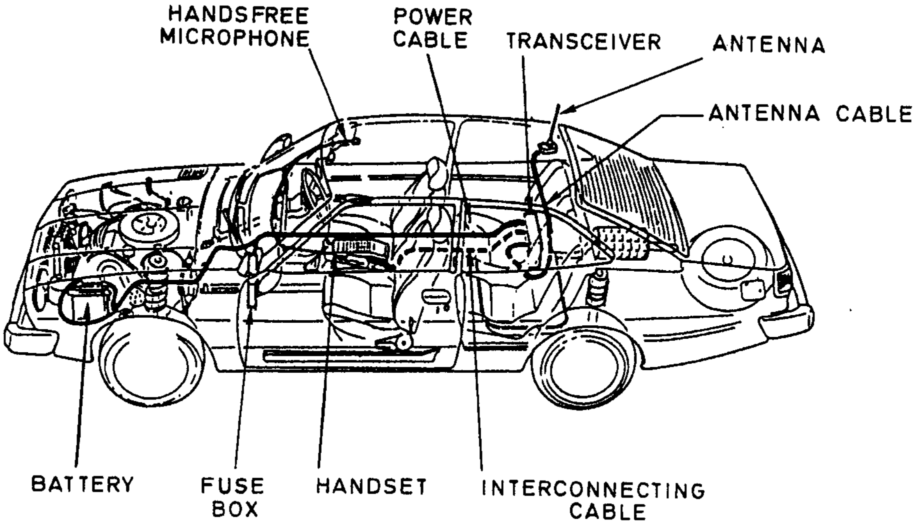


Figure 4.1 Typical Mobile Installation

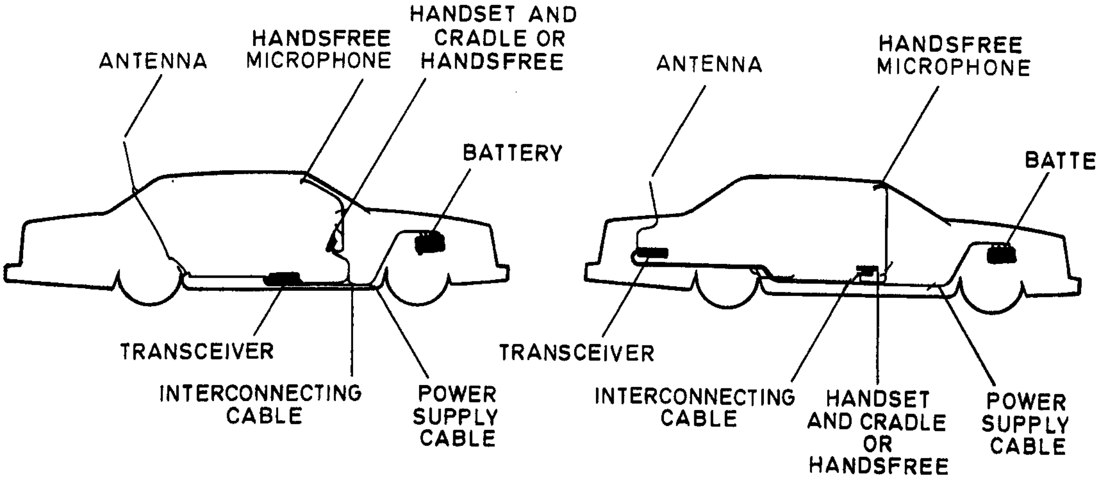

HANDSET AND CRADLE OR HANDSFREE
HANDSFREE MICROPHONE
ANTENNA
BATTERY
TRANSCEIVER
INTERCONNECTING CABLE
POWER SUPPLY CABLE
ANTENNA
HANDSFREE MICROPHONE
BATTERY
TRANSCEIVER
INTERCONNECTING CABLE
HANDSET AND CRADLE OR HANDSFREE
POWER SUPPLY CABLE

Figure 4.2 Alternative Mobile Installations

The actual location of the various units may vary according to the vehicle type: information regarding unit location is provided in the individual unit installation guides given later in this chapter.

Note: The location of the Antenna (not supplied) should be as shown in either Figures 4.1 or 4.2. Installing the Antenna elsewhere may markedly reduce the sensitivity of the mobile telephone.

The routing of power and interconnection wiring may also vary according to the vehicle type, however the following precautionary remarks should be observed when siting wiring:

(1) Mount cables to the vehicle such that they are not prone to displacement or disconnection through vibration.

(2) Route cables through existing ducts/grooves in the vehicle floor, where possible.

(3) Route cable through existing holes in the dashboard, bulkheads etc, where possible.

(4) Site cables such that contact with moving parts (e.g. brake/clutch pedals, seat mechanisms, etc) is avoided.

(5) Site cables as far away as possible from existing cabling in order to avoid electrical induction.

(6) When connecting cables to the vehicle's circuitry, ensure that the vehicle functions are not affected.

4.4 POWER SUPPLY CABLE

4.4.1 POWER SUPPLY CABLE CONNECTIONS

Figure 4.3 shows the power supply cable and power control cable system.

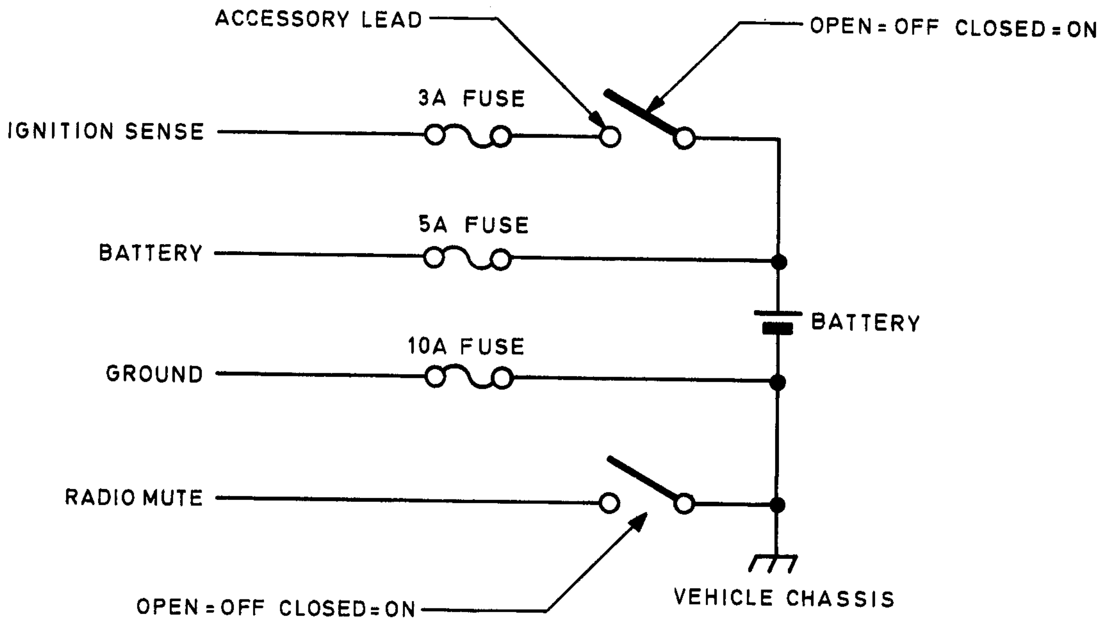

ACCESSORY LEAD
OPEN = OFF CLOSED = ON
3A FUSE
IGNITION SENSE
5A FUSE
BATTERY
BATTERY
10A FUSE
GROUND
RADIO MUTE
OPEN = OFF CLOSED = ON
VEHICLE CHASSIS

Figure 4.3 Power Supply Cable and Power Control Cable

Figure 4.4 shows a general view of the Power Supply Cable. The cable is approximately 5.5 m long: 3 m and 7 m cables are available as options.

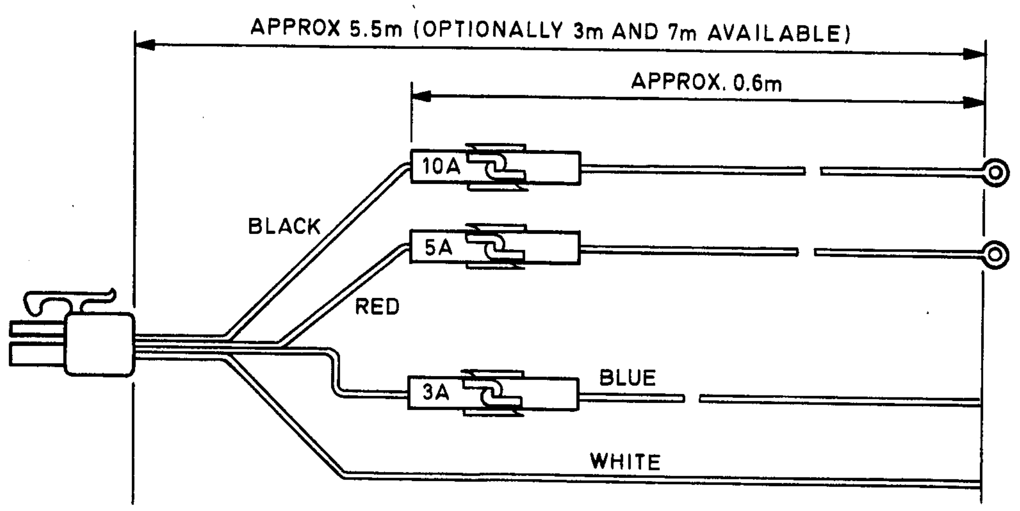

APPROX 5.5m (OPTIONALLY 3m AND 7m AVAILABLE)
APPROX. 0.6m
10A
BLACK
5A
RED
3A
BLUE
WHITE

Figure 4.4 Power Supply Cable External View

Table 4.1 below details the Power Supply Cable Connector leads and their associated use.

Table 4.1 Power Supply Cable Connector

CABLE CONNECTED	FUSE CONNECTED	USE
Black	10A	Ground
Blue	3A	Ignition Sense
Red	5A	Battery (+)
White*		Radio Mute

* Radio Mute ON : short circuit to ground, Radio Mute OFF : open circuit

Horn alert operation is available by using Horn Alert Kit EB-W0091 (for off-road vehicle use only). The Horn Alert Kit is connected between the Transceiver Unit and the Power Supply Cable, as shown in Figure 4.5 below.

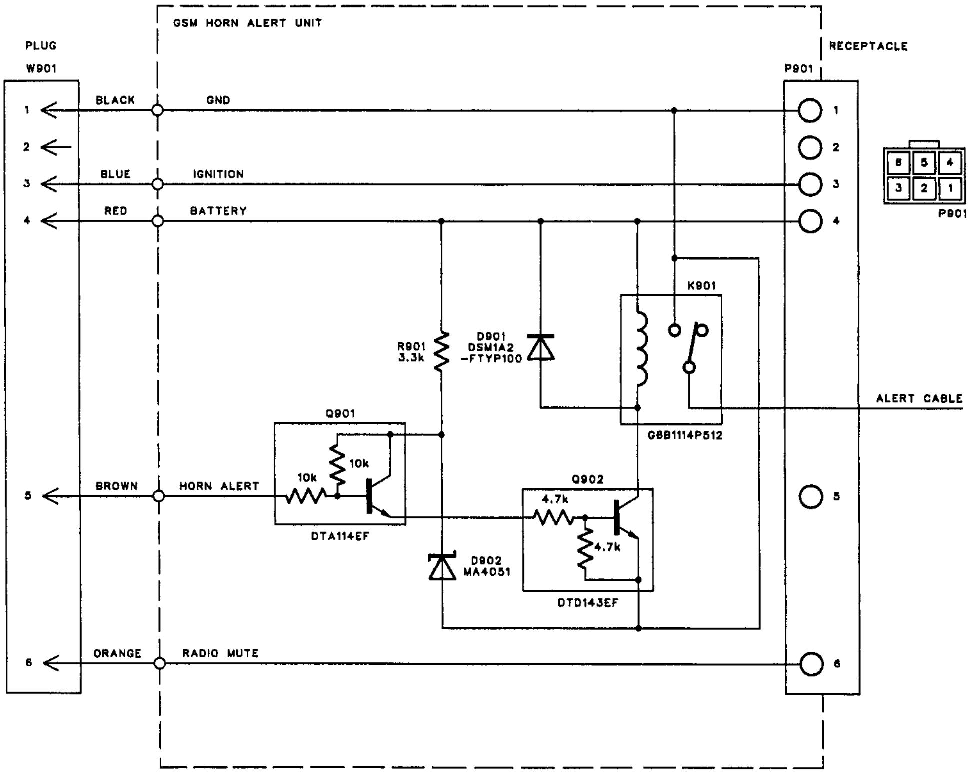

GSM HORN ALERT UNIT
PLUG
W901
RECEPTACLE
P901
1
2
3
4
5
6
BLACK
GND
BLUE
IGNITION
RED
BATTERY
6 5 4
3 2 1
P901
K901
R901
3.3k
D901
DSM1A2
-FTYP100
ALERT CABLE
Q901
10k
10k
G8B1114P512
Q902
4.7k
4.7k
BROWN
HORN ALERT
DTA114EF
D902
MA4051
DTD143EF
ORANGE
RADIO MUTE

Figure 4.5 Horn Alert Kit Wiring

4.4.2 POWER SUPPLY CABLE INSTALLATION

To install the Power Supply Cable, proceed as follows:

(1) Prior to routing the cable, disconnect all the wires from the negative terminal of the vehicle battery. Reconnect the wires to the vehicle battery terminal only after completion of wiring.

(2) Route the cable from the Transceiver Unit location through to the engine compartment. Select existing holes (e.g. for passage of cable through the dash-board), where possible.

(3) Protect the cable in the engine compartment using corrugated tube, and mount securely to the vehicle. Wrap the end of the corrugated tube with vinyl tape.

Note: The fuse holder for the cable must be installed to provide easy maintenance.

4.5 INTERCONNECTING CABLE

4.5.1 INTERCONNECTING CABLE DETAILS

Figure 4.6 shows a general view of the Interconnecting Cable. The cable is approximately 5.5 m long: 3 m and 7 m cables are available as options.

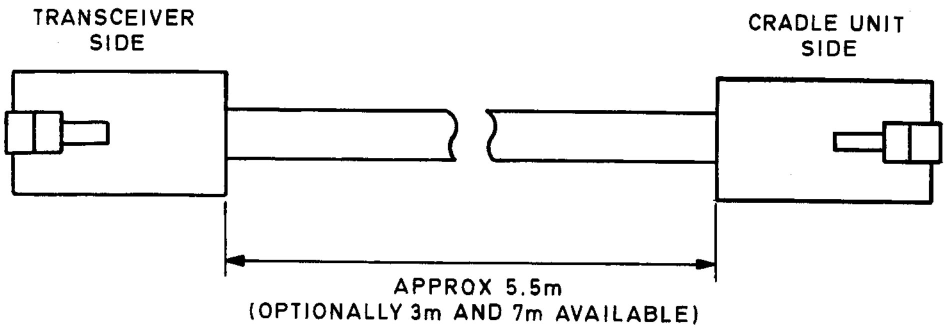


Figure 4.6 Interconnecting Cable

4.5.2 INTERCONNECTING CABLE INSTALLATION

To install the Interconnecting Cable, proceed as follows:

(1) Route the cable from the Transceiver Unit to the Handsfree Cradle Unit.

(2) Route the cable along existing grooves and ducts in the vehicle floor where possible. If ducts or grooves are not available, select a route that will prevent damage caused by passengers.

(3) Secure the cable at suitable locations, ensuring that the connectors at either end of the cable are not subjected to undue stress..

4.6 TRANSCEIVER UNIT

4.6.1 SITING THE TRANSCEIVER UNIT

Characteristic features and functions of Transceiver Unit EB-2803 call for careful siting of the unit. In addition, to ensure long service life and reliability, and to facilitate maintenance, select the location with particular emphasis on the following:

(1) Avoid direct exposure to the sun's rays.

(2) Avoid placing the unit on top of heat-generating bodies (mufflers,etc).

(3) Avoid exposure to rain, or possibility of the unit getting submerged in water.

(4) Ensure that fixing holes can be drilled easily.

(5) Avoid the rear part of the vehicle trunk, as this area is most likely to sustain damage in the event of a collision with another vehicle.

(6) Ensure easy access for maintenance.

(7) Avoid affecting any functions of the vehicle, where possible.

(8) Ensure sufficient access to enable easy connection of the Transceiver Unit cables.

(9) Avoid siting the unit where it may be subjected to pressure or shocks due to materials or people travelling in the vehicle.

(10) Ensure the location takes due consideration of cable routing requirements.

4.6.2 MARKING THE INSTALLATION POSITION

(1) Place the Transceiver mounting tray in position and mark the four mounting positions with a marker.

(2) If the installation location is not flat, select higher (convex) areas for the mounting hole positions. Check that the locations selected for mounting holes have no obstructions behind them (i.e. pipes, fuel tank etc).

4.6.3 DRILLING MOUNTING HOLES

(1) Punch the hole positions marked for drilling (refer to Figure 7 (a) below).

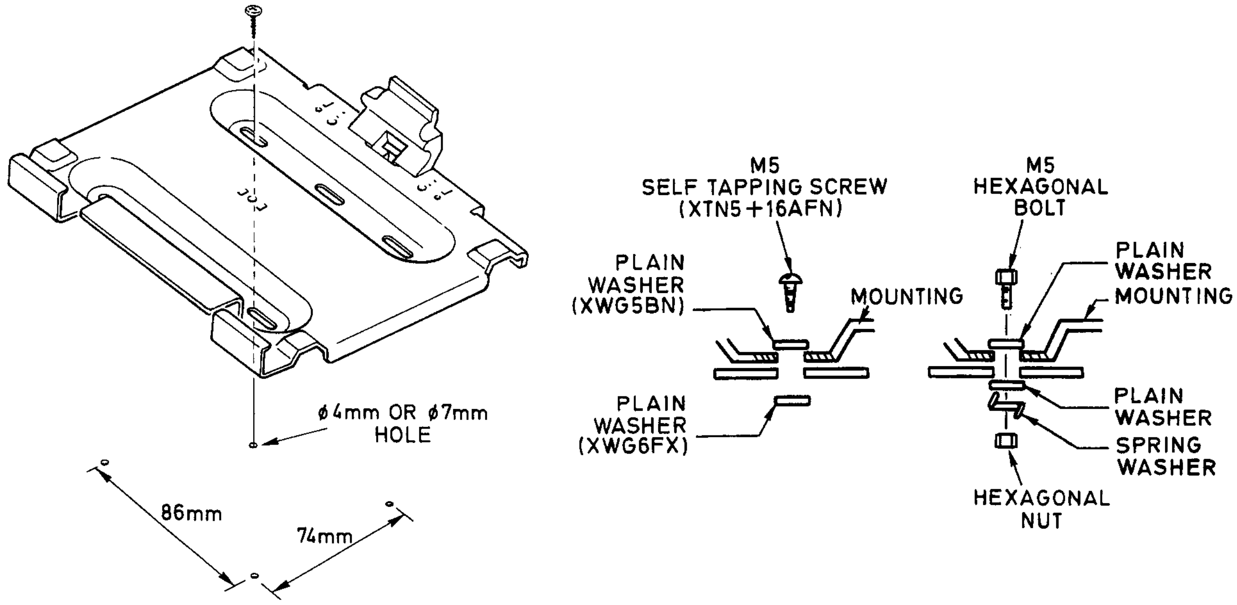
(2) If the mounting plane is thin, then bolts will be required for mounting the unit: drill 7 mm holes. If the mounting plane is thick, then screws can be used: drill 4 mm holes.

(3) If nuts and bolts are to be used, deburr the holes.

(4) Apply rust inhibitor to the surface of cut edges.

4.6.4 MOUNTING

(1) Mount the Transceiver mounting tray to the vehicle using M5 self tapping screws, or M5 hexagonal bolts, as appropriate. Refer to Figure 4.7 (b) for details.


ø4mm OR ø7mm HOLE
86mm
74mm
M5 SELF TAPPING SCREW (XTN5+16AFN)
PLAIN WASHER (XWG5BN)
MOUNTING
PLAIN WASHER (XWG6FX)
M5 HEXAGONAL BOLT
PLAIN WASHER
MOUNTING
PLAIN WASHER
SPRING WASHER
HEXAGONAL NUT

(a) Drilling Positions

(b) Assembly Details

Figure 4.7 Fitting the Transceiver Mounting Tray

(2) Apply a waterproofing agent around the bolts.

4.6.5 MOUNTING THE TRANSCEIVER UNIT

Engage the grooves of the Transceiver Unit with the fixed hooks of the mounting tray and rotate the Transceiver Unit down into the tray as shown in Figure 4.8. The Transceiver Unit is automatically locked on to the mounting tray by the movable hook.

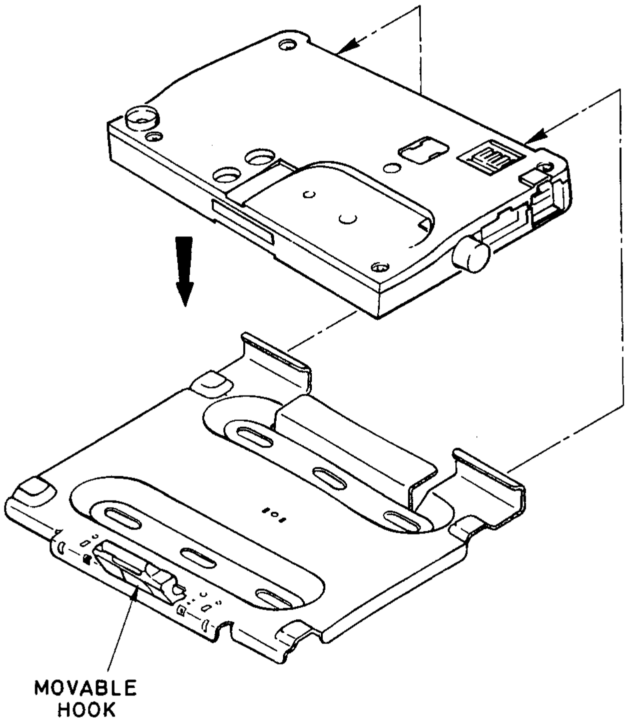


Figure 4.8 Mounting the Transceiver Unit

4.6.6 DETACHING THE TRANSCEIVER UNIT

If it is required to detach the Transceiver Unit, push down the movable hook of the mounting tray, and lift the Transceiver Unit up and out of the tray (refer to Figure 4.9).

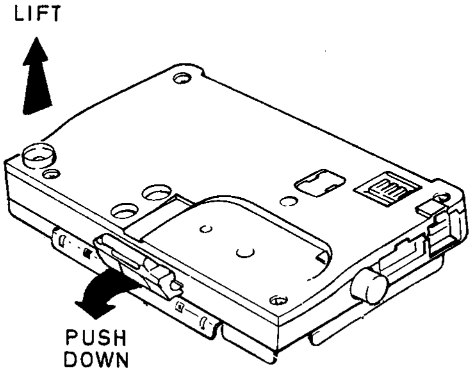


Figure 4.9 Detaching the Transceiver Unit

4.6.7 CONNECTION

Connect the Power Supply Cable and Interconnecting Cable to the Transceiver Unit. (If necessary, refer to Chapter 2, Figure 2.8 for details.).

4.7 HANDSFREE CRADLE UNIT

4.7.1 SITING THE HANDSFREE CRADLE UNIT

The following points should be considered when choosing a location for the Handsfree Cradle Unit:

(1) Ensure the location does not obstruct normal operation/function of the vehicle.

(2) Ensure the location does not affect passenger sitting position/accommodation, or is subject to excessive shocks.

(3) Ensure that the location will afford easy operation of the unit.

(4) Ensure that the location provides a secure fixing for the unit.

(5) Avoid direct exposure to the sun's rays, or to rain.

(6) Ensure that the location takes due consideration of cable routing requirements.

Considering the points listed above, the following locations are recommended for mounting the Handsfree Cradle Unit:

(1) Locations in the passenger compartment (refer to Figure 4.10):

    (a) Dashboard.

    (b) Centre console, storage compartment.

    (c) Centre console.

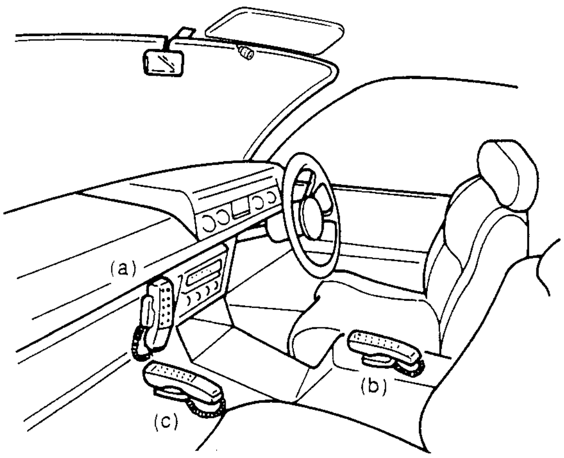


Figure 4.10 Handsfree Cradle Unit Locations

4.7.2 MOUNTING THE HANDSFREE CRADLE UNIT

The Handsfree Cradle Unit can be mounted either direct (using self tapping screws), or using the adjustable angle bracket.

4.7.2.1 Direct Installation

(1) Disassemble the Handsfree Cradle Unit.

  (a) Remove one M3 screw (B) located under rubber bung (A), and separate the cover from the base (refer to Figure 4.11).

  (b) Disconnect the speaker connector.

(2) Mark the Installation Position

  (a) Place the base in position and mark the two mounting positions with a marker (refer to Figure 4.11).

(3) Drilling Holes for Mounting

  (a) If the mounting location is on hard plastic, drill a 2 mm hole at each of the positions marked. Select the diameter of the holes on the basis of the material and plate thickness of the mounting location.

(4) Mounting

  (a) Mount the base using two M4 self-tapping screws (refer to Figure 4.11).

(5) Reassemble the Handsfree Cradle Unit.

  (a) Reconnect the speaker connector, and replace the cover.

  (b) Ensure that the cover is correctly engaged in the base, then tighten the screw (B). Replace the rubber bung (A).

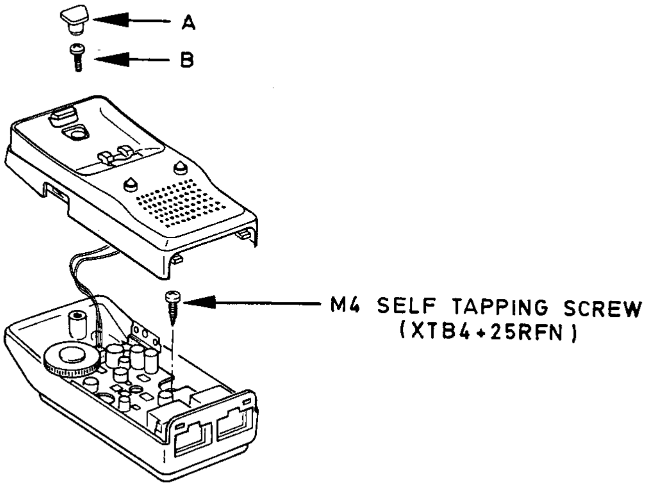


Figure 4.11 Direct Installation of the Handsfree Cradle Unit

4.7.2.2 Installation Using the Adjustable Angle Bracket

A general view of the Adjustable Angle Bracket is provided in Figure 4.12 below.

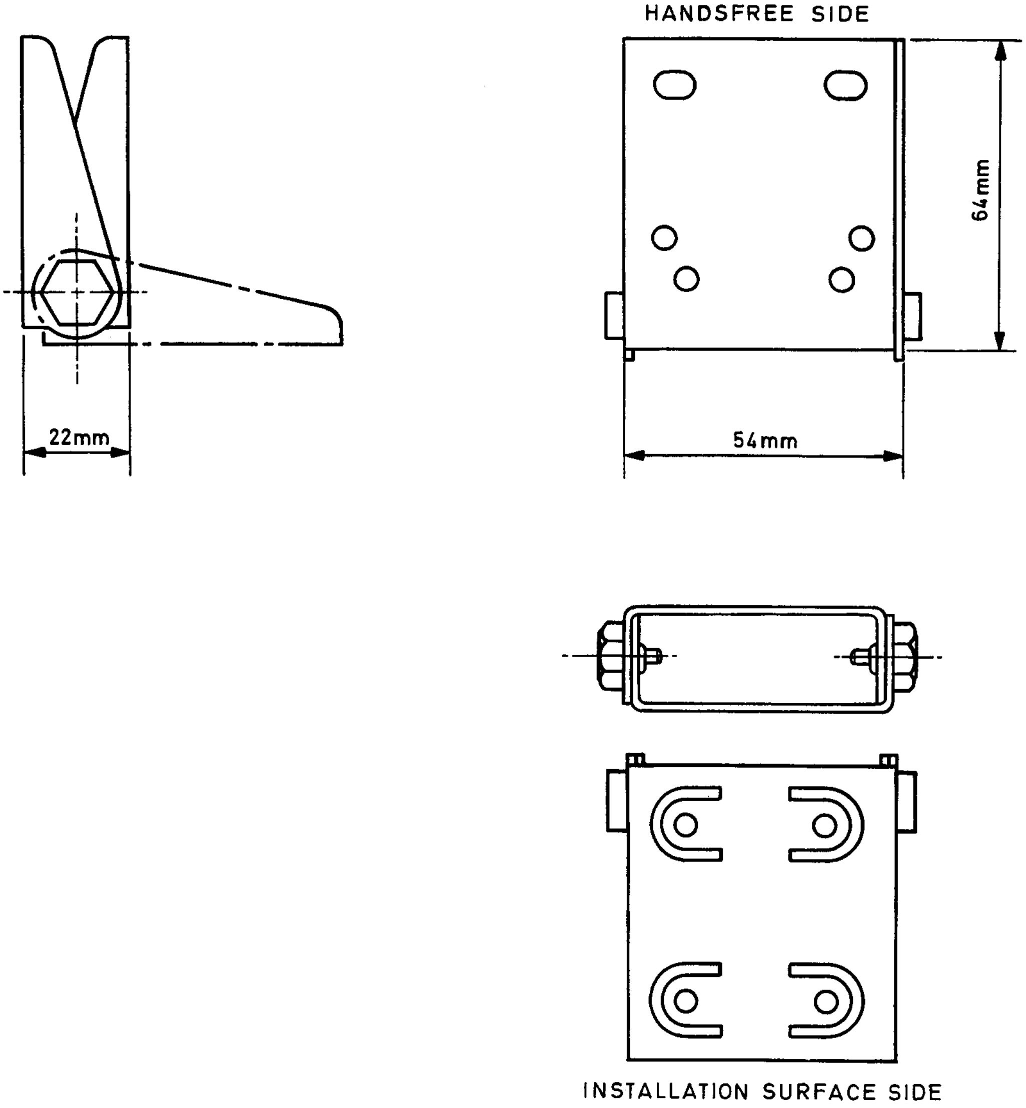


Figure 4.12 Adjustable Angle Bracket

(1) Marking the Installation Position for the Adjustable Angle Bracket.

  (a) Place the adjustable angle bracket in position and mark the four mounting holes with a marker (refer to Figure 4.12).

(2) Drilling Holes for Mounting the Adjustable Angle Bracket.

  (a) If the mounting location is on hard plastic, drill a 2 mm hole at each of the positions marked. Select the diameter of the holes on the basis of the material and plate thickness of the mounting location.

(3) Mounting the Adjustable Angle Bracket.

(a) Mount the adjustable angle bracket by means of four M4 self-tapping screws (refer to Figure 4.13 below).

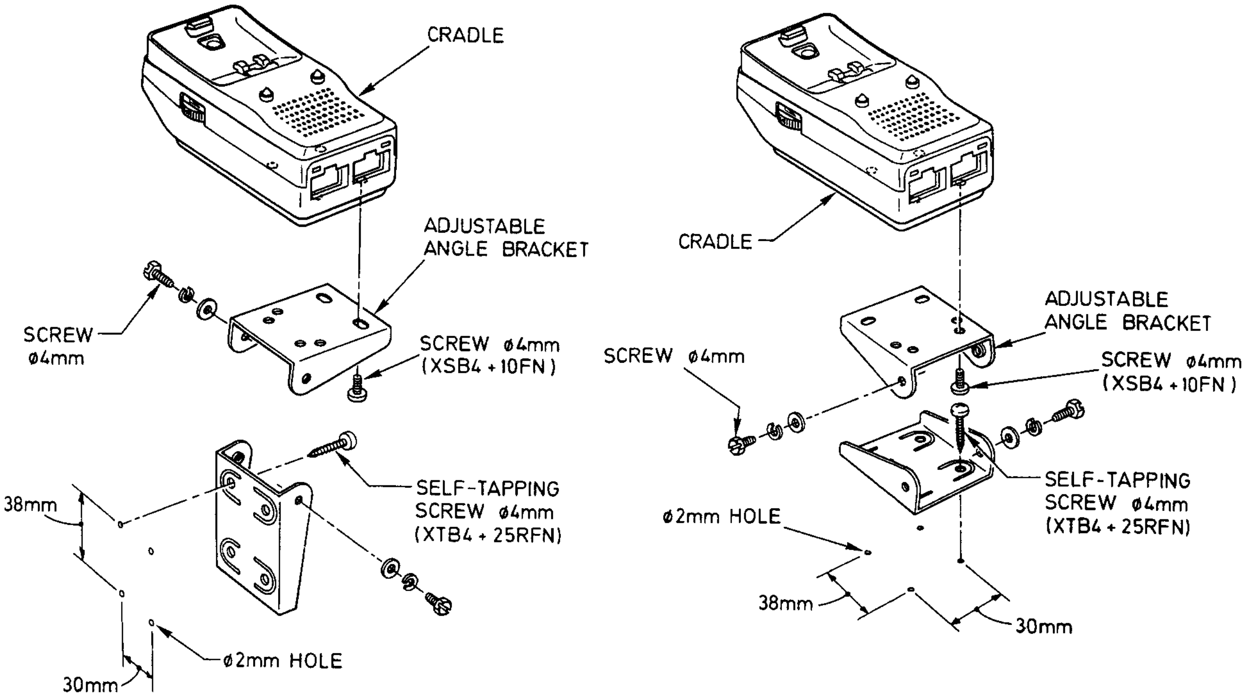

CRADLE
ADJUSTABLE ANGLE BRACKET
SCREW ø4mm
SCREW ø4mm (XSB4 + 10FN)
SELF-TAPPING SCREW ø4mm (XTB4 + 25RFN)
38mm
30mm
ø2mm HOLE
CRADLE
SCREW ø4mm
ADJUSTABLE ANGLE BRACKET
SCREW ø4mm (XSB4 + 10FN)
SELF-TAPPING SCREW ø4mm (XTB4 + 25RFN)
ø2mm HOLE
38mm
30mm

Figure 4.13 Adjustable Angle Bracket Mounting Details

(4) Mounting the Handsfree Cradle Unit on the Adjustable Angle Bracket.

(a) Mount the Handsfree Cradle Unit onto the adjustable angle bracket using four M4 screws.

Caution

If any screws other than those provided with the Panasonic adjustable angle bracket are used, choose screws so that length from the base bottom to the screw end is between 0.28 inch (7 mm) to 0.35 inch (9 mm).

4.7.3 CONNECTION (INTERCONNECTING CABLE AND HANDSET UNIT)

Connect the Interconnecting Cable and the Handset Unit to the Handsfree Cradle Unit. (If necessary, refer to Chapter 2, Figure 2.8 for details.)

4.8 HANDSFREE MICROPHONE

Figure 4.14 shows a general view of Handsfree Microphone, together with its base and clip.

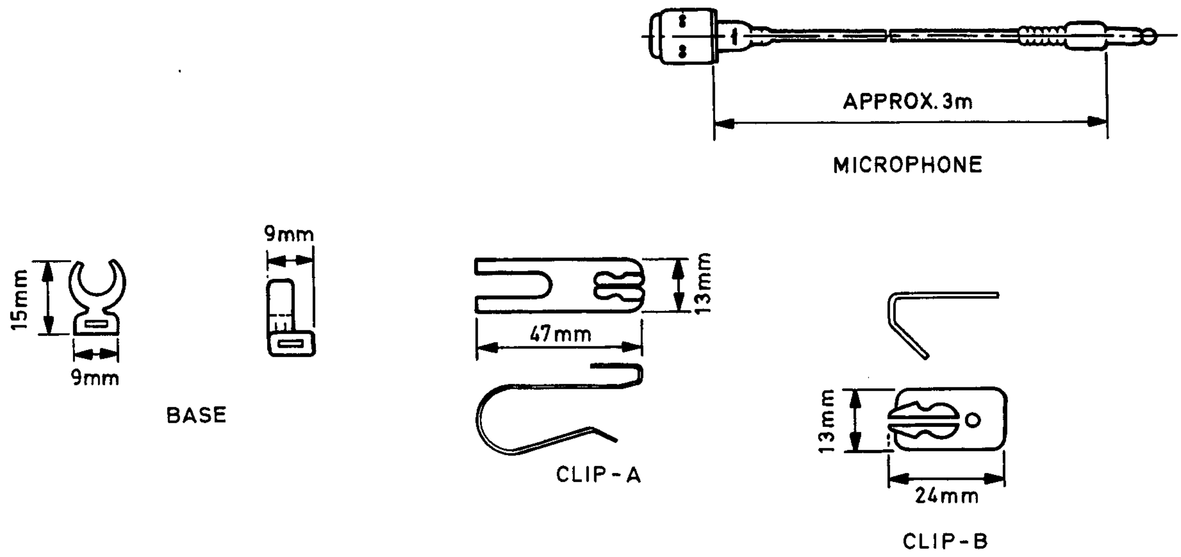


Figure 4.14 Handsfree Microphone, Base and Clip

4.8.1 SITING THE HANDSFREE MICROPHONE

The following points should be considered when choosing a location for the Handsfree Microphone.

(1) It does not obstruct operation of the vehicle.

(2) It does not affect the normal passenger accommodation.

(3) The microphone is pointed towards the driver's mouth.

4.8.2 MOUNTING THE HANDSFREE MICROPHONE

(1) Mount the clip to the microphone by inserting the projection of the clip into the hole of microphone base, as shown in Figure 4.15.

Note: The microphone can be inserted into four different positions of the clip. Choose a position that will point directly towards the driver's mouth, once the clip has been installed.

(2) Mount the microphone on the sunvisor as shown in Figure 4.15.

(3) Connect the Handsfree Microphone to the Handsfree Cradle Unit. (If necessary, refer to Chapter 2, Figure 2.8 for details.)

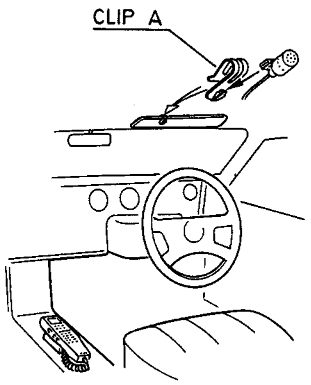


Figure 4.15 Mounting the Handsfree Microphone

4.9 TRANSPORTABLE CASE UNIT

To use the mobile telephone in a transportable application, proceed as follows (refer to Chapter 2, Figure 2.9 for assembly and connection details):

(1) Engage the grooves of the Transceiver Unit with the fixed hooks of the Transportable Case Unit, and rotate the Transceiver Unit down into case. Lock the Transceiver Unit into position using the large captive locking screw situated in the middle of the Handset recess (on the reverse side).

(2) Engage the Handset connector into the associated connector slot in the Transceiver Unit body.

(3) Clip the Handset to the stowage provided on the Transportable Case Unit body.

(4) Fit the battery pack by engaging the fixed hooks into the associated slots on the Transportable Case Unit, and rotating the battery pack down onto the case, clicking it firmly into position.

(5) If required, connect an external power supply to the Transceiver Unit power supply connector. Vehicle battery power may be applied via the cigarette lighter plug/cable assembly, alternatively the AC-DC converter may be used.

4.10 TROUBLESHOOTING

If the mobile telephone does not operate when installed, please check the following before calling service personnel.

4.10.1 HANDSFREE CAR MOUNT USE

(1) Symptom: NO POWER. Check the following:

  (a) Ensure that the Handset curly cord is fully engaged into the Handsfree Cradle Unit.

  (b) Ensure that the Transceiver Unit is fully engaged into the mounting tray.

  (c) Check all fuses and wiring leading to the mobile telephone. Ensure that no connections are loose, disconnected or damaged.

4.10.2TRANSPORTABLE USE

(1) Symptom: NO POWER. Check the following:

(a) Ensure that the Transceiver Unit is fully engaged into the Transportable Case Unit, and the Handset curly cord is firmly engaged into the receptacle on the Transceiver Unit body.

(b) Ensure that the battery pack is installed properly, and that it has been fully charged using the internal charging unit of the Transportable Case.

(c) Ensure that the correct cigarette lighter plug is used for the particular vehicle: using an incorrect plug may cause the cigarette lighter accessory fuse to blow on some vehicles.

4.10.3HANDSFREE CAR MOUNT USE AND TRANSPORTABLE USE

(1) Symptom: "NO SVC (NO SERVICE)" indication. Check the following:

(a) Try moving to a different location: depending on the local terrain, the signal may be blocked, i.e. you are in a communication 'dead spot'.

(b) Check the antenna and connector. Ensure that the connector is firmly threaded onto the associated connector on the Transceiver Unit body: hand-tighten only.

5. OPERATING GUIDE

IMPORTANT SAFETY/OPERATING PRECAUTIONS

Before using your GSM mobile telephone, please read carefully the following safety precautions:

(1) Pressing any key on the keypad may cause a loud tone to be emitted from the Handset speaker. Ensure that the Handset is away from your ear before pressing any key.

(2) For optimum operation of the equipment, and for safety reasons, do not allow any part of the human body within 20 cm of the antenna during operation.

(3) Obey all restrictions specified within your country concerning the use of mobile telephones whilst driving.

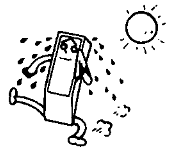
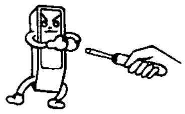
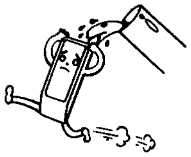
(4) Switch off your mobile telephone when in an aircraft. Use of mobile telephones in aircraft may be dangerous to the operation of the aircraft, may disrupt the cellular network and is ILLEGAL. Failure to observe this instruction may lead to suspension or denial of cellular telephone service to the offender, or legal action, or both.

(5) Users are advised to turn off the equipment when at a refuelling point, or any place where a sign is posted restricting the use of two-way radio equipment such as a construction site, blasting area, etc.

(6) Do not install or connect the mobile telephone if the vehicle is positive (+) grounded.

(7) During extended operation, the Transceiver may become very warm. This is to be expected and does not indicate a fault. Be careful if touching the Transceiver directly after extended operation.

When operating your GSM mobile telephone, observe the following precautions to ensure optimum equipment performance.

DON'T	DO
DON'T use this equipment in an extreme environment where high temperature or high humidity exists. 	DO use the equipment under conditions where temperatures are within -20°C to +60°C for car mount use, and -10°C to +40°C for transportable use.
DON'T attempt to disassemble this equipment. There are no user-serviceable parts inside. 	DO refer any servicing to qualified service personnel.
DON'T abuse this equipment. Avoid striking, shaking, or holding by the coiled cord.	DO handle this equipment with care.
DON'T expose this equipment to water, or spill beverages on it. 	DO take immediate action if the equipment becomes wet. Turn OFF and refer servicing to qualified service personnel.

5.1 INTRODUCTION

5.1.1 GENERAL

The GSM Digital Cellular Mobile Telephone is approved for connection to the Pan-European GSM Digital Mobile Network. This operating guide describes the basic operation, and advanced features of your GSM mobile telephone when used on this network.

There are basically two ways of using your GSM mobile telephone: IN CAR (MOBILE) USE, or TRANSPORTABLE USE, depending upon your particular kit installation (refer to Chapter 2).

(1) IN CAR USE - When driving, the Handset is stowed to the Handsfree Cradle. You talk through the Handsfree Microphone and listen to the other party through the Handsfree Speaker.

- When the vehicle is stationary (i.e. parked), you may, if desired, use the Handset (removed from the Handsfree Cradle) to talk and listen. YOU MUST NOT DRIVE WHILST USING THE HANDSET.

(2) TRANSPORTABLE USE - For transportable use, the Transceiver and Handset are fitted to the Transportable Case. You may talk and listen through the Handset once it has been lifted from its stowage on the Transportable Case.

Within this operating guide, standard operations (applicable to both IN CAR and TRANSPORTABLE USE) are described from para 5.2, operations unique to TRANSPORTABLE USE are described in para 5.25. Troubleshooting information is provided in para 5.26.

5.1.2 GSM MOBILE TELEPHONE NETWORKS

In order to use your GSM mobile telephone, you will require a SIM (para 5.1.3) registered with a GSM Mobile Telephone Network, referred to as your HOME mobile network.

The GSM system permits you to use your telephone with any GSM network, which may include GSM mobile networks in other European countries. This facility is known as ROAMING (para 5.10). Contact your authorised dealer for further details.

5.1.3 SUBSCRIBER IDENTIFICATION MODULE (SIM)

The GSM mobile telephone has the facility to operate with two types of Subscriber Identification Module (SIM). You may have chosen either:

(1) An internal SIM, which is semi-permanent and may only be removed by qualified personnel.

(2) A 'Smart Card' SIM, the size of a credit card, which slots into the top of your telephone, and may be removed and inserted for use in any GSM mobile telephone.

The SIM contains all information necessary to operate the GSM mobile telephone, including your telephone number. Your authorised dealer can give you more information about your SIM.

5.1.4 OPTIONAL KIT/ACCESSORIES

Details of kit/accessories available as options are given in Chapter 2.

5.2 FEATURES

The various features offered by your GSM mobile telephone are listed below. All features are fully described later in this chapter.

5.2.1 GENERAL FEATURES

- Escalating ringing tone
- Automatic redial
- Last number redial
- Digit clearing function
- Any key answer
- Mute function
- DTMF signalling and flash function
- Dropped call warning tone
- Continuous talk after ignition off

5.2.2 MEMORY FEATURES

- Up to 999 stored number memories
- Unanswered call memory for up to 10 unanswered calls
- Automatic or manual memory allocation
- Scratch pad memory for number input during conversation
- Pause dial facility
- Dialled number memory

5.2.3 DISPLAY/INDICATION FEATURES

- Flexible 12 digit by 4 lines alpha-numeric display
- Upper/lower case, Number and Character modes
- Function and status indicator
- Received signal strength indicator
- Received signal quality indicator
- Own telephone number display
- Invalid Personal Identification Number (PIN) indication
- Country/network indication: indicates your registered country code and network
- Display of the telephone number called

5.2.4 SECURITY FUNCTIONS

- Automatic lock to prevent unauthorised use by requiring identification using the PIN
- Full lock prevents all outgoing calls, except for emergency services
- Partial lock allows calls that can be made only from the stored number memory, received call memory and last number dialled memory

5.2.5 PROGRAMMABLE FUNCTIONS

- Language selection: 10 language options are available for the display (function guide and warnings)
- Call restriction
- Silent incoming call
- Horn alert
- Automatic answer
- Emergency call enable
- PIN disable
- HOME mobile network only
- Country/Mobile network selection

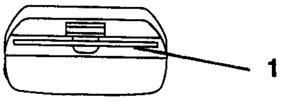
- Individual call length timer
- Non-resettable cumulative call length timer
- Resettable cumulative call length timer
- Automatic power OFF
- Timer off timer
- Clock
- Alarm

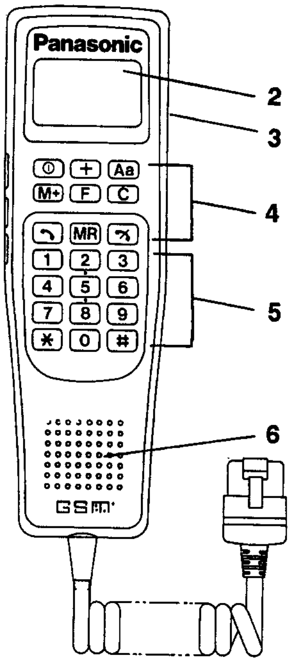
5.2.6 SUPPORTING FUNCTIONS

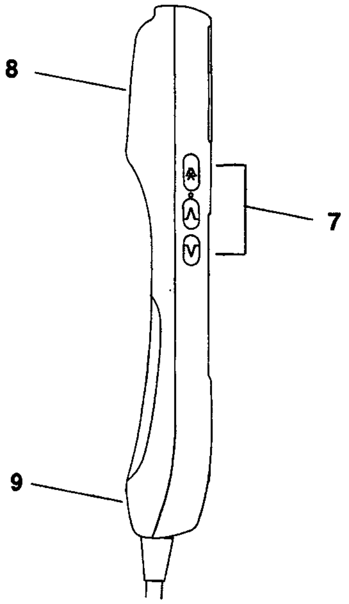
- Self testing
- Low battery voltage alarm
- Low voltage power off
- Battery remainder indication

5.3 HANDSET CONTROLS AND DISPLAY

5.3.1 HANDSET CONTROLS







1. **SIM CARD SLOT**
2. **LIQUID CRYSTAL DISPLAY**

   12 Digit x 4 Lines, alpha-numeric

3. **SIM CARD EJECT BUTTON**

   Slide up to eject 'Smart Card' SIM

4. **FUNCTION KEYS**

⏻	Power on/off key
+	International access code input, and pause dialling
Aa	Alpha-mode on/off key
M+	Store to memory, and confirmation key
F	Function mode key, and switching between upper case, lower case and numeric input
C	Clear key (last character entered, or clear display)
☎	Send key (originates a call)
MR	Memory recall key (recalls a telephone number from memory)
☎	End key (terminates a call)

5. **DIGIT KEYS**

   Standard 3 x 4 key matrix

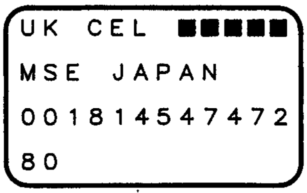
6. **HANDSET SPEAKER**
7. **VOLUME CONTROL KEYS**

🔇	Mute key (mutes the Handset or Handsfree microphone)
∧ ∨	Volume up/down keys. Also memory scrolling and function selection mode.

8. **HANDSET EARPIECE**
9. **HANDSET MICROPHONE**

5.3.2 HANDSET DISPLAY

The basic layout of the Handset display is shown below:



```
UK CEL ■■■■■
MSE JAPAN
001814547472
80
```

- First Line
- Second Line
- Third Line
- Fourth Line

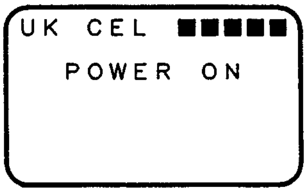
- **First Line**
  Indicates status and received signal strength. Status is usually country name and PLMN code number, with IN USE, RCL, STO, MUTE, NO SERVICE, Function Codes and special messages displayed as appropriate.

- **Second Line**
  Indicates alpha tag (up to 12 characters), date and programmed messages.

- **Third and Fourth Lines**
  Indicate telephone number input, memorised telephone number, date, programmed special messages and key operation guide.

A few examples of typical displays are given below:

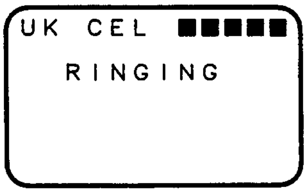
- Wake up display



```
UK CEL ■■■■■
  POWER ON
```

- Home country/PLMN and 5 steps signal strength
- Power On indication

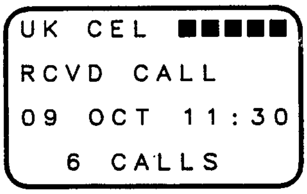
- Incoming call display



```
UK CEL ■■■■■
  RINGING
```

- Home country/PLMN and 5 steps signal strength
- Blinking 'RINGING' indication (with flashing backlight)

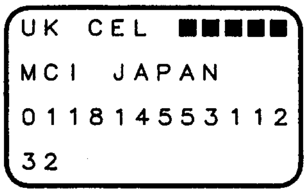
- Received call indicator



```
UK CEL ■■■■■
RCVD CALL
09 OCT 11:30
  6 CALLS
```

- Home country/PLMN and 5 steps signal strength
- Received call indication
- Time stamp of last received call
- Number of calls received during absence

- Dialled digits indicator



```
UK CEL ■■■■■
MCI JAPAN
011814553112
32
```

- Home country/PLMN and 5 steps signal strength
- Name tag (if entered)
- Dialled digits
- Dialled digits (cont'd)

5.4 QUICK REFERENCE GUIDE

5.4.1 BASIC FUNCTIONS

FUNCTION	KEY OPERATIONS
● TO SWITCH ON/OFF	[⏻]
● TO RECEIVE A TELEPHONE CALL	ANY KEY EXCEPT [⏻] [🔇] [∧] [∨]
● TO MAKE A TELEPHONE CALL:	
MANUALLY	[TELEPHONE NUMBER] [☎] (USE FULL DIALLING CODE EVEN FOR LOCAL CALLS)
FROM MEMORY	[MR] [MEMORY LOCATION (001 TO 999)] [☎]
SPEED DIALLING	[MEMORY LOCATION (1 TO 999)] [#] [☎]
● TO CLEAR MISDIALLED DIGIT(s):	
LAST DIGIT	[C] HOLD FOR LESS THAN 1/2 SECOND
ALL DIGITS	[C] HOLD UNTIL ALL DIGITS CLEARED
● TO CHECK OVERFLOW DIGITS	[F] [F] HOLD DOWN SECOND KEYPRESS
● TO REDIAL LAST NUMBER:	
NUMBER DISPLAYED	[☎]
NUMBER NOT DISPLAYED	[MR] [0] [0] [0] [☎]
● TO SWITCH TO HANDSFREE USE	[🔇] THEN STOW HANDSET TO HANDSFREE CRADLE
● TO SWITCH TO HANDSET USE	REMOVE HANDSET FROM HANDSFREE CRADLE
● TO ADJUST VOLUME	[∧] TO INCREASE LEVEL (DURING A CALL) [∨] TO DECREASE LEVEL (DURING A CALL)
● TO MUTE MICROPHONE	[🔇] PRESS AGAIN TO UNMUTE MICROPHONE
● TO END A TELEPHONE CALL	[📵]
● EMERGENCY CALLS	[1] [1] [2] [☎]
● TO DISPLAY OWN NUMBER	[F] [7] [1]
● TO CHANGE BACKLIGHT COLOUR	[F] [5] [2] , THEN USE [∧] AND [∨] KEYS TO SELECT SCREEN COLOUR. THEN PRESS [M+] TO STORE SELECTED COLOUR. PRESS ANY KEY TO CLEAR THE SCREEN.

5.4.2 ADDITIONAL FUNCTIONS

FUNCTION	KEY OPERATIONS
• TO INVOKE FUNCTION MENU	[F] DISPLAYS FIRST THREE MENU ITEMS. USE [∧] [∨] KEYS TO SCROLL THROUGH MENU. PRESS [C] TO EXIT THE FUNCTION MENU.
• TO USE DIAL MEMORY:	
DIRECT NUMBER ALLOCATION	[TELEPHONE NUMBER] [M+] [MEMORY LOCATION (001 TO 999)]
AUTOMATIC ALLOCATION	[TELEPHONE NUMBER] [M+] [*]
NAME TAGGING A STORED NUMBER	[TELEPHONE NUMBER] [Aa] , THEN USE KEYS LISTED BELOW TO ENTER NAME TAG: [∧] [∨] SCROLL THROUGH ALPHABET [#] ENTER CHARACTER [F] SELECT UPPER/LOWER CASE/NUMERIC [Aa] ENTER/EXIT ALPHA MODE [C] CLEAR INCORRECTLY ENTERED CHARACTERS WHEN NAME TAG COMPLETE, PRESS [M+] [MEMORY LOCATION (001 TO 999)] OR [*]
ALPHA-NUMERIC SEARCH, USING FIRST LETTER OF NAME TAG	[MR] [Aa] [∧] OR [∨] TO SCROLL, THEN [☎] TO DIAL
• TO USE SCRATCH PAD:	
SAVING TO SCRATCH PAD	[TELEPHONE NUMBER] AUTOMATICALLY SAVED BY TELEPHONE
SCRATCH PAD RECALL/REDIAL	[MR] [*] , THEN [☎] TO DIAL
• TO SCROLL THROUGH MEMORY:	
IF MEMORY LOCATION IS KNOWN	[MR] [MEMORY LOCATION (001 TO 999)] THEN [∧] OR [∨] TO SCROLL

ADDITIONAL FUNCTIONS (continued)

FUNCTION	KEY OPERATIONS
● TO PAUSE DIAL:	
PROGRAMMING	[TELEPHONE NUMBER] [+] [TELEPHONE NUMBER] [+] .... REPEAT AS REQUIRED
DIALLING	[PAUSED TELEPHONE NUMBER]........ [☎] .... [☎] (AS PAUSED NUMBER)
● TO DIAL INTERNATIONAL NUMBERS:	
MANUALLY	[+] [TELEPHONE NUMBER (INCLUDING COUNTRY CODE)] [☎] (DO NOT ENTER COUNTRY CODE FOR INLAND CALLS)
FROM MEMORY	[+] [MR] [MEMORY LOCATION (001 TO 999)] [☎]
● TO ADJUST TONE VOLUMES:	
KEY IN TONE	[∧] TO INCREASE LEVEL (NOT WHILST IN USE) [∨] TO DECREASE LEVEL (NOT WHILST IN USE)
RINGING TONE	[F] [4] [1] THEN [∧] OR [∨]
SILENT INCOMING CALL	[F] [4] [1] THEN [∨] TO SELECT LEVEL 0.
ESCALATING RINGING TONE	[F] [4] [1] THEN [∧] TO SELECT LEVEL 5
SILENT KEYING OPERATION	[F] [5] [1] THEN [∧] FOR OFF/ON.
● TO SET AUTO ANSWER: (HANDSFREE USE ONLY)	[F] [4] [2] THEN [∧] OR [∨] FOR ON OR OFF, FOLLOWED BY [M+]
● TO PROGRAM ROAMING FUNCTIONS:	
HOME NETWORK ONLY	[F] [7] [3] THEN [∧] [∨] TO ACTIVATE/DEACTIVATE, FOLLOWED BY [M+]
SYSTEM TRANSFER	[F] [7] [2] THEN [∧] [∨] TO LOCATE ALTERNATIVE SYSTEM, FOLLOWED BY [M+]

ADDITIONAL FUNCTIONS (continued)

FUNCTION	KEY OPERATIONS
● TO PROGRAM SECURITY FUNCTIONS:	
AUTO LOCK SELECTION	[F] [3] [1] THEN [1] [LOCK CODE] [M+] THEN [1] - FOR FULL LOCK [2] - FOR PART LOCK [3] - TO UNLOCK
CHANGING LOCK CODE	[F] [3] [1] THEN [2] [(OLD) LOCK CODE] [M+] THEN [NEW LOCK CODE] [M+] [M+]
PIN CODE ACTIVATION	[F] [3] [2] THEN [1] [PIN] [M+] FOLLOWED BY [∧] TO TURN PIN ON/OFF, FOLLOWED BY [M+]
CHANGING PIN	[F] [3] [2] THEN [2] [(OLD) PIN] [M+] THEN [NEW PIN] [M+] [M+]
● TO PROGRAM CLOCK/TIMER FUNCTIONS:	
CLOCK	[F] [8] [1] THEN [1] (CLOCK), OR [2] (YEAR). THEN USE [∧] AND [M+] TO SET DATE/MONTH/TIME OR YEAR. PRESS ANY KEY EXCEPT [⏻] [🔕] [∧] [∨] TO EXIT.
ALARM TIME SETTING	[F] [8] [4] THEN [∨] (ALARM ON) [∧] TO CHANGE SETTING. USE [DIGITS 0 TO 9] AND [M+] TO SET TIME.
DE-ACTIVATING ALARM	[F] [8] [4] THEN [∧] UNTIL DISPLAY READS OFF. PRESS ANY KEY EXCEPT [⏻] [🔕] [∧] [∨] TO EXIT.

5.4.3 ADVANCED FUNCTIONS

FUNCTION	KEY OPERATION
● INDIVIDUAL CALL LENGTH TIMER	F 1 1
● NON-RESETTABLE CUMULATIVE CALL TIMER	F 1 2
● RESETTABLE TOTAL CALL LENGTH TIMER	F 1 3
● LANGUAGE SELECTION	F 6 1
● AUTOMATIC POWER OFF	F 8 3
● POWER OFF TIMER	F 8 2
● HORN ALERT	F 4 3
● BATTERY REMAINDER INDICATION	F 2 1

5.5 BASIC OPERATION

5.5.1 SWITCHING ON

(1) For car mount use, place the Handset in the Handsfree Cradle and turn the vehicle's ignition switch to ON or ACCESSORY.

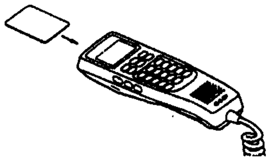
For transportable use, either lift the Handset from the Transportable Case, or leave it in position.

(2) Press ⏻

A tone will be heard and the telephone will check to see if the PIN security feature is enabled (para 5.11). If you have a 'Smart Card' SIM, the telephone will prompt you to insert your SIM card.

```
INSERT
SIM CARD
```

The SIM is inserted at the top of the Handset by lining up the arrows on the card and the Handset, and gently pushing the card downwards.



(3) If requested, enter your PIN code (more detail concerning PIN code entry is given in para 5.11.1).

```
ENTER PIN

--------
( 0-9   M+ )
```

(4) After entering your PIN code

Press M+

The message 'NO SERVICE' should now be displayed for about 5 seconds. If your mobile telephone is within the radio coverage area of your HOME network, your telephone will enter Standby mode, displaying the Mobile Network Code, signal strength and the date/time.

```
NO SERVICE
```

```
UK CEL ■■■■■

09 OCT 10:00
```

Notes: 1. If the 'NO SERVICE' message continues, this means your telephone is outside the radio coverage area of your HOME network. Another network may be available for use (refer to para 5.10). If you move into the coverage area, the 'NO SERVICE' display will be replaced by the Standby mode display.

2.. If the vehicle ignition was turned off without switching off the Handset, your telephone will be automatically switched on the next time the vehicle ignition is turned on.

3. You may have chosen to activate the telephone security function. If so, before using your telephone you will either have to:

   (a) Enter your personal identification number (PIN).

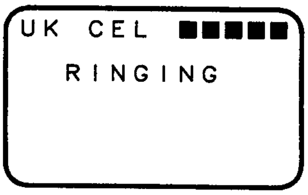
   (b) Use the UNLOCK procedure, if you have chosen to PART LOCK or FULL LOCK your telephone.

   These functions are described fully in para 5.11.

5.5.2 RECEIVING A CALL

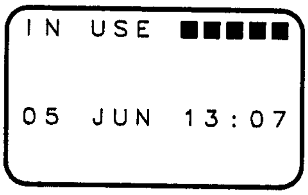
Normally, you will not be able to receive calls if 'NO SERVICE' is displayed.

(1) When someone calls you, a ringing tone will be heard and 'RINGING' will flash on the display.



If you do not want the telephone to ring, you may activate the Silent Incoming Call function (para 5.8).

To answer the call, press any key except ⏻ , 🔕 , ∧ , or ∨ . Alternatively, lift the Handset from the Handsfree Cradle (car mount use only). The display will show 'IN USE', and normal conversation can begin.



Note: For Handsfree operation, the call is automatically answered after 6 seconds if this fucntion is active (para 5.9).

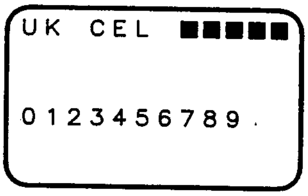
5.5.3 MAKING A CALL

Normally, you can only make a call if the messages 'NO SERVICE', 'PART LOCK', or 'FULL LOCK' are not displayed (refer to para 5.11). EMERGENCY CALLS (112) CAN BE MADE REGARDLESS OF ANY SECURITY FUNCTIONS (see para 5.5.11).

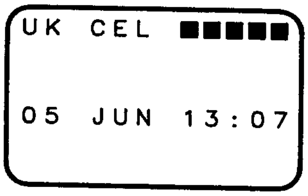
(1) To dial manually

Press TELEPHONE NUMBER ☎

Use the full dialling code, even for local calls.



The display will show 'IN USE'. After a short pause, the ringing tone will be heard. When your call is answered, normal conversation can begin.

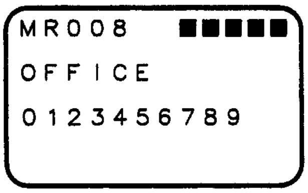


If a re-order tone or an intercept tone (para 5.24) is heard from the Handset speaker you will have to redial. Press [☎] then make sure that the correct digits are entered and the message 'NO SERVICE' is not displayed. To redial, press [☎] .

(2) To dial from memory

Press [MR] [MEMORY LOCATION (001 TO 999)]

The memory location number must be entered as a 3 digit number, e.g. location number 8 would be entered as [0] [0] [8] , location number 56 would be entered as [0] [5] [6] .



```
MR008    ■■■■■
OFFICE
0123456789
```

Press [☎] . Call connection is as described in (1) above.

Notes: 1. Numbers recalled from memory may be edited: Press [C] once to delete the last digit, hold down [C] to delete further digits.

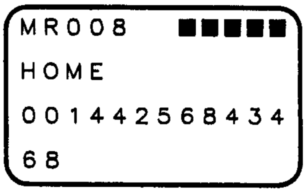
2. Numbers cannot be recalled from memory if FULL LOCK is active (para 5.11).

(3) Speed dialling

The speed dialling facility provides an alternative method of recalling a telephone number from memory, using only 1 or 2 digits: using speed dialling, location 008 is entered as 8, location 056 is entered as 56.

Press [MEMORY LOCATION (1 TO 999)] [#] [☎]

Call connection is as described in (1) above.



```
MR008    ■■■■■
HOME
001442568434
68
```

If you wish to scroll to other memory locations, press [Λ] or [V] , as required.

5.5.4 CLEARING MISDIALLED DIGITS

If an error has been made when entering the telephone number and you want to delete the last digit, press [C] once.

If you want to delete all of the digits entered, press and hold down [C] until all digits have cleared.

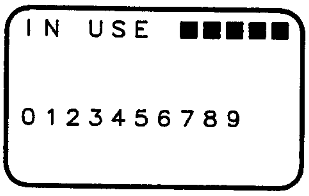
5.5.5 CHECKING OVERFLOW DIGITS

The telephone number entered may be up to 48 digits long, including pause codes and international dialling codes. Only the first 24 digits are usually displayed. To read the overflow digits, press [F] twice, holding down the second key press.

5.5.6 REDIALLING LAST NUMBER

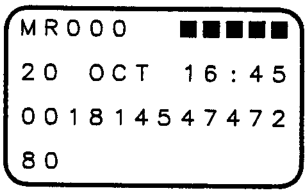
Ensure that the 'FULL LOCK' is not displayed.

If the last number dialled is still displayed, simply press ☎ to redial the number.



```
IN USE ■■■■■

0123456789
```

If the number is not displayed, press MR 0 0 0.



```
MR000      ■■■■■
20 OCT   16:45
0018145474 72
80
```

Any of the last 10 numbers dialled may now be accessed by using the ∧ and ∨ keys to scroll through the numbers. When the desired number is displayed, press ☎ to redial the number.

Note: If you press ☎ when no number is displayed, the last number displayed is dialled.

5.5.7 SWITCHING FROM HANDSFREE TO HANDSET USE

(1) During Handsfree operation (in car mount use only) you can switch to Handset use by simply lifting it from the Handsfree Cradle.

(2) To revert to Handsfree use:

Press ✱, and replace the Handset on the Handsfree Cradle.

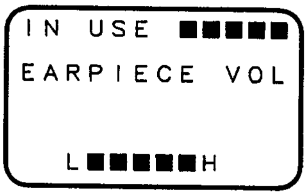
Note: When ambient background noise makes handsfree conversation difficult, switch to Handset use (observe in-country regulations concerning the use of mobile telephones whilst a vehicle is in motion).

5.5.8 ADJUSTING THE VOLUME (RECEIVED SPEECH)

Press ∧ to increase volume.

Press ∨ to decrease volume.

The volume level is displayed during adjustment.



```
IN USE ■■■■■
EARPIECE VOL

   L■■■■■H
```

There are 5 steps of adjustment for loudspeaker volume (Handset/Handsfree), or earpiece volume: 0 (minimum) to 4 (maximum). The volume level can be adjusted by pressing and holding the appropriate button.

The loudspeaker volume can be adjusted during handsfree conversation, or when no calls are being made.

The earpiece volume can be adjusted whilst you are using the Handset during conversation.

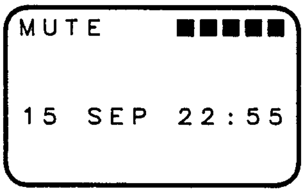
Once the volume level is adjusted, it will be held in memory even after the power is switched off.

5.5.9 MUTING THE MICROPHONE

The mute function allows you to mute the Handset or Handsfree microphone during conversation, so that you can hear the other party, but they cannot hear you.

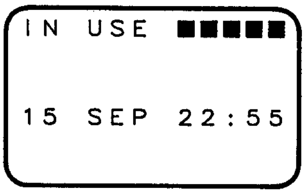
Press [🔇] to mute the microphone.

A 'mute' indication will appear on the display.



```
MUTE       ■■■■■

15  SEP  22:55
```

Press [🔇] again to unmute the microphone. The 'mute' indication disappears from the display.



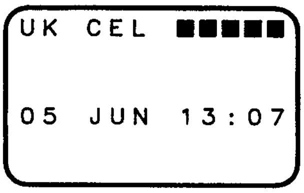
```
IN  USE  ■■■■■

15  SEP  22:55
```

Note: If a call is ended whilst the mute facility is active, it is automatically cancelled.

5.5.10 ENDING A CALL

When you have finished your call:

Press [☎], or place the Handset on-hook (either the Handsfree Cradle or the Transportable Case). The Handset reverts to standby mode, displaying the Mobile Network Code, signal strength and the date/time.



```
UK  CEL  ■■■■■

05  JUN  13:07
```

5.5.11 MAKING EMERGENCY CALLS

Calls to the emergency services (POLICE, FIRE, AMBULANCE) are made by dialling 112.

Press [1] [1] [2] [☎]

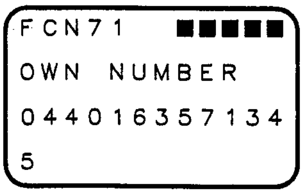
Emergency calls can be made from your telephone REGARDLESS OF ANY SECURITY FUNCTIONS YOU HAVE ACTIVE. An 'EMERGENCY' indication is given on the display during the call.

Emergency calls DO NOT REQUIRE A SIM CARD TO BE INSERTED.

5.5.12 DISPLAYING OWN NUMBER

Press [F] [7] [1]

This displays the telephone number of the SIM currently in use. Press any key to clear the display.



```
FCN71    ■■■■■
OWN  NUMBER
044016357134
5
```

5.5.13 CHANGING BACKLIGHTING COLOUR

The backlight colour of the display and keypad can be changed to green or amber using the F52 function.

Press [F] [5] [2]

This displays the backlight colour (green or amber). To alternate between colours use the [Λ] [V] keys.

```
FCN52      ■■■■■
BACK LIGHT
   GREEN
( Λ   V   M+ )
```

Press [M+] to store the selected colour.

```
FCN52      ■■■■■
BACK LIGHT
   AMBER
    SET!
```

Press any key to clear the display.

In Transportable use, the keypad and display will be illuminated for 10 seconds after Power ON, or any key input. If no key is pressed during this time, the illumination will automatically go off, in order to save battery power, until another key is pressed. For mobiles, the display will always be illuminated after Power ON.

5.5.14 SWITCHING OFF

Press [⏻]

Alternatively, turn the vehicle ignition switch to OFF. Your telephone has been programmed such that a call that is in progress will continue after the ignition has been switched off, until the call is completed.

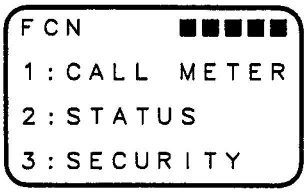
When the [⏻] key is pressed, or the call is ended after the ignition has been switched off, the display blanks.

Note: If the Handset is switched ON and you turn the ignition switch to OFF without pressing the Handset [⏻] key, the telephone will automatically power up the next time the vehicle ignition is switched ON.

5.6 FUNCTION MENU

Table 5.1 below provides a summary of telephone operations which may be initiated from the function menu.

To enter the function menu, press F . The titles of the first 3 functions available will be displayed. To scroll to other functions use the ∧ , ∨ keys.



```
FCN       ■■■■■
1:CALL METER
2:STATUS
3:SECURITY
```

To display the functions stored under function title, press the appropriate number, 0 to 9 . To select a function press the required function number. See the appropriate section in this guide for more details. Press C to exit from the function menu.

Table 5.1 Function Menu

NO.	NAME	DESCRIPTION
1	FCN 1:	CALL TIMERS 1) FCN 11: Individual Call Length Timer 2) FCN 12: Total Length Timer 1 3) FCN 13: Total Length Timer 2
2	FCN 2:	STATUS 1) FCN 21: Battery Meter 2) FCN 22: Received signal Quality Meter
3	FCN 3:	SECURITY 1) FCN 31: Equipment (Telephone Lock) 2) FCN 32: PIN Operations
4	FCN 4:	RINGING 1) FCN 41: Ring Volume 2) FCN 42: Automatic Answer 3) FCN 43: Horn Alert
5	FCN 5:	KEY 1) FCN 51: Key Tone 2) FCN 52: Backlight Colour
6	FCN 6:	LANGUAGE 1) FCN 61: Language Selection
7	FCN 7:	SYSTEM 1) FCN 71: Own Number 2) FCN 72: Country/Mobile network select 3) FCN 73: HOME mobile network ONLY
8	FCN 8:	CLOCK 1) FCN 81: Clock set 2) FCN 82: Timer-off 3) FCN 83: Auto-off 4) FCN 84: Daily Alarm
9	FCN 9:	Reserved for short message service

5.7 MEMORY FUNCTIONS

5.7.1 STORING A TELEPHONE NUMBER

Up to 999 telephone numbers, each of up to 20 digits, can be stored on your SIM, depending on the SIM's storage capacity (refer to your authorised dealer for further details). Each telephone number is assigned a memory location, between 001 and 999. A 12 digit alpha-numeric name tag may also be stored with each telephone number. All memorised information, including telephone numbers and name tags, is stored on your SIM. If you use a 'Smart Card' SIM, this information is portable from telephone to telephone.

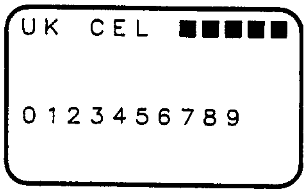
Telephone numbers can be stored by Direct Number Allocation, or Automatic Allocation.

5.7.1.1 Direct Number Allocation

Direct Number Allocation is used when you want to store a telephone number in a particular memory location, or if you want to overwrite an existing memory location.

(1) Enter [TELEPHONE NUMBER]

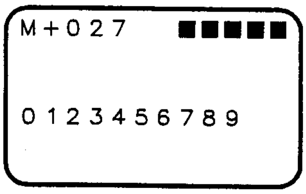
(2) Press [M+] [MEMORY LOCATION (001 TO 999)]



UK CEL ■■■■■

0123456789

The memory location entry must be a 3 digit entry, e.g. to store a number in memory location 27, enter [0] [2] [7] .



M+027 ■■■■■

0123456789

If the selected memory location is currently allocated, the display will flash. In this case you may either overwrite the number currently stored at that location, or you may decide to save your telephone number in a different memory location.

To overwrite an existing telephone number press [M+] .

To move to the next vacant memory location, press [∧] or [∨]. Press [M+] to save your telephone number at this location.

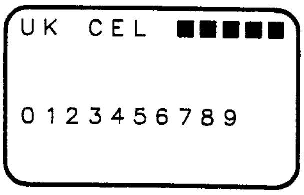
Note: To end the vacant memory search, press any key except [⏻] , [☎] , [∧] or [∨] .

5.7.1.2 Automatic Allocation

Using this facility, the telephone will automatically save the telephone number to the next available vacant memory location.

(1) Enter [TELEPHONE NUMBER]

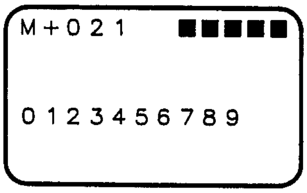
(2) Press [M+] [*]



UK CEL ■■■■■

0123456789

The memory location to which the telephone number is saved will be displayed on the first line of the display.

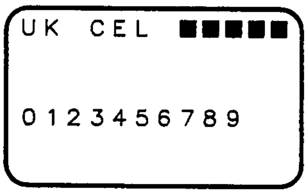


If nothing is displayed when M+ and * are pressed, this indicates that there are no vacant memory locations available. In this case you will have to overwrite an existing memory location using the Direct Number Allocation procedure, described above.

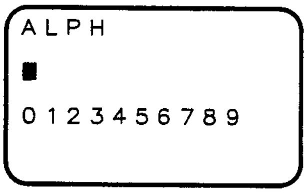
5.7.1.3 Name Tagging a Stored Number

You may assign a name tag of up to 12 characters (alpha or numeric) to each stored telephone number.

(1) Enter TELEPHONE NUMBER



(2) Press Aa to enter alpha mode.
Cursor '■' is displayed.

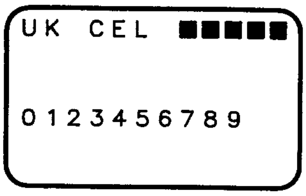


The following keys may then be used to enter the name tag:

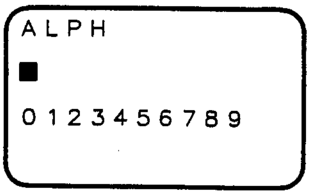
Λ	to scroll forwards through the alphabet
V	to scroll backwards through the alphabet
#	to enter character and move to next digit
F	to alternate between upper case and lower case letters and numbers/special characters
Aa	to enter, or exit alpha mode
*	to move cursor back to previous digit
C	to clear character(s) entered incorrectly

As an example, to name tag the telephone number for Bob:

(1) Enter TELEPHONE NUMBER for Bob

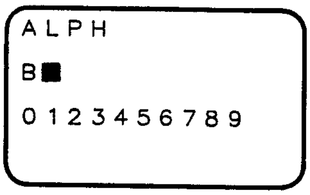


(2) Press Aa to enter the alpha mode
Cursor '■' is displayed.



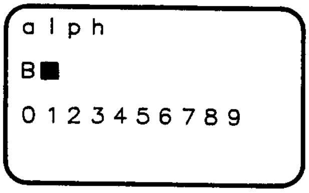
(3) Press ∧ or ∨ until the letter 'B' is displayed.

(4) Press # to enter this character, and move to the next digit.

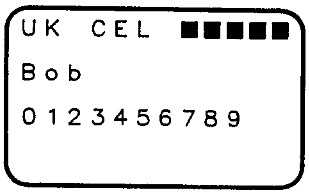


(5) Press F to select lower case letters.

(6) Repeat steps 3 and 4 above for the remaining characters of the name tag.

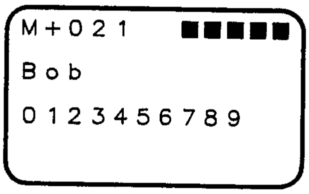


(7) When all characters of the name tag have been entered, press Aa to exit alpha mode.
Cursor '■' will then disappear.



(8) Press M+ MEMORY LOCATION (001 TO 999)

OR * to store the telephone number together with its name tag.



Notes: 1. Only 12 characters can be used for a name tag. If more than 12 are entered, only the last 12 entered are used.

2. It is possible to combine other characters into the name tag, including numbers 0 to 9, keyboard characters such as #, £, !, and special European language characters. To do this, press F until 'NUM/SPECIAL' appears in the top line of the display. Press ∧ or ∨ to scroll through the number/special character options, then press # to enter the number/special character and move to the next digit.

5.7.2 SEARCHING BY NAME TAG INITIAL

You may search for a telephone number stored in memory by the initial of the name tag.

(1) Press MR to start the memory recall procedure.

(2) Press Aa ∧ or ∨ to scroll through the memory; release the 'scroll' key when the required name tag and associated telephone number are found.

(3) Press ☎ to call the number, or C to clear the display.

Notes:
1. You will not be able to make the call if 'FULL LOCK' is displayed.
2. When the telephone is in PARTIAL LOCK (para 5.11) you can only search the stored number memory (001 to 999), the last 10 received calls memory, and the last 10 numbers dialled memory.
3. If no name tag has been stored with the letters (or numbers) you enter, nothing will be displayed.

5.7.3 SCRATCH PAD FACILITY

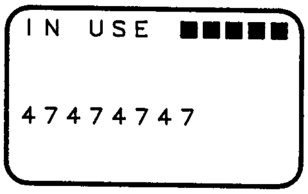
An area of the SIM is set aside as a scratch pad memory. This facility allows you to use the display as a scratch pad during a call: up to 20 digits can be entered.

5.7.3.1 Saving to Scratch Pad

(1) Ensure that 'PART LOCK' or 'FULL LOCK' is not displayed.

(2) Enter [TELEPHONE NUMBER] during the call.

DTMF tones will be heard and the number will appear on the display.



When the call ends, the digits entered are saved to the scratch pad memory. Only one scratch pad memory is available, and the contents are automatically overwritten the next time you use it.

Note: It is also possible to save a name tag to the scratch pad memory during a call, using the name tagging procedure (para 5.7.1.3).

5.7.3.2 Recalling from Scratch Pad

(1) Ensure that 'PART LOCK' or 'FULL LOCK' is not displayed.

(2) Press [MR] [*] to recall from scratch pad.

(3) Press [☎] to call the number, or use the memory store functions to save the number to memory.

5.7.4 PAUSE DIALLING

The pause dial function is used to access functions such as long distance access codes, voice mail retrieval, and other services outside the mobile telephone network.

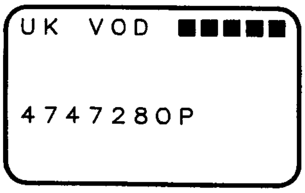
Note: When 'PART LOCK' or 'FULL LOCK' is displayed, pause dial functions are not available.

5.7.4.1 Manual Pause Dial Programming

(1) Enter [DIAL NUMBER]

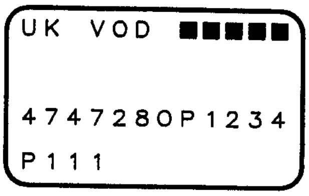
(2) Press [+] to enter pause dial code.

A letter 'P' will be displayed.



(3) Enter next [DIAL NUMBER]

(4) If required, press [+] to enter another pause dial code, followed by the next [DIAL NUMBER] .



UK VOD ■■■■■

4747280P1234
P111

The pause dial number is now entered and ready for sending (refer to para 5.7.4.3).

Note: Pause dial numbers must have a pause dial code (P) in between each section of the number. The last input must be a dial number, not a pause dial code.

5.7.4.2 Programming Pause Dial from Multiple Memory Locations

This procedure may be used if the numbers that you wish to send as a pause dial number are stored in multiple memory locations.

(1) Press [MR] [MEMORY LOCATION (001 TO 999)] to recall the first number from the first memory location.

(2) Press [+]

(3) Press [MR] [MEMORY LOCATION (001 TO 999)] to recall the second number from the second memory location.

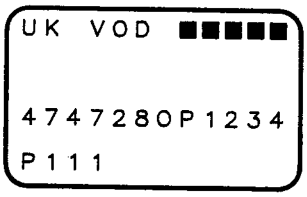
(4) Repeat steps (2) and (3) until all of the component parts of the pause dial number have been retrieved from memory.

The pause dial number is now retrieved and ready for sending (refer to para 5.7.4.3).

Note: Pause dial numbers must have a pause dial code (P) in between each section of the number. The last input must be a memory location (ie a dial number), not a pause dial code.

5.7.4.3 Sending Pause Dial Numbers

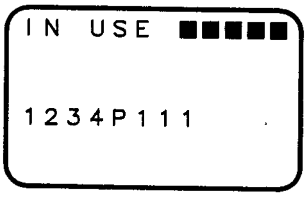
The pause dial number is entered either manually, or from multiple memory locations.



UK VOD ■■■■■

4747280P1234
P111

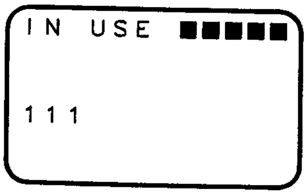
(1) Press [☎] to dial the first number up to the first 'P' (i.e. 4747280). Commence conversation.



IN USE ■■■■■

1234P111

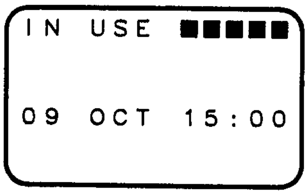
(2) Press [☎] to send the second number up to the next 'P' (i.e. 1234). This number is sent as DTMF tones.



IN USE ■■■■■

111

(3) Press ☎ to send the last number (i.e. 111).
This number is also sent as DTMF tones.



Complete pause dial numbers, i.e. those which include the 'P' character, cannot be stored in SIM memory. However, they will be saved in the last 10 numbers dialled memory. To search this memory:

(1) Press [MR] [0] [0] [0]

(2) Use the [∧] [∨] keys to scroll through the memory.

5.8 VOLUME FUNCTIONS

Receiving volume, key-in tone and ringing tone are all adjustable. You may also program your telephone for silent key operation.

5.8.1 RECEIVING VOLUME ADJUSTMENT/MICROPHONE MUTE

Receiving volume adjustment and microphone mute functions are described in full under Basic Operation, paras 5.5.8 and 5.5.9, respectively.

5.8.2 KEY-IN TONE ADJUSTMENT

This function CANNOT be used when 'IN USE' is displayed (during conversation).

Press [∧] to increase volume

Press [∨] to decrease volume

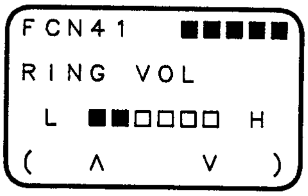
There are 5 steps of volume level adjustment: 0 (minimum) to 4 (maximum).

Once the level is adjusted, it will be held in memory even after the power is switched off.

5.8.3 RINGING TONE ADJUSTMENT

(1) Press [F] [4] [1] to invoke this function.

(2) Press [∧] to increase volume,
[∨] to decrease volume.



The ringing tone volume can be adjusted between level 0 (minimum) and level 5 (maximum), i.e. there are 6 steps of adjustment.

The ringing tone volume level is shown by a ringing volume bar indicator.

5.8.4 SILENT INCOMING CALL

(1) Press [F] [4] [1] to invoke the ringing tone adjustment function.

(2) Press [∨] to decrease the volume to Level 0.

With the ringing tone set to Level 0, the Silent Incoming Call mode is initiated. In this mode, the display will flash to indicate an incoming call, but no ringing tone will be heard.

5.8.5 ESCALATING RINGING TONE

(1) Press F 4 1 to invoke the ringing tone adjustment function.

(2) Press ∧ to increase the volume to level 5.

With the ringing tone set to level 5, the Escalating Ringing Tone mode is initiated. In this mode, the ringing tone will escalate during incoming calls, starting from level 1, then stepping through to level 5.

5.8.6 SILENT KEYING OPERATION

(1) Press F 5 1 to invoke this function.

(2) Press ∧ to turn keying confirmation OFF, then M+ twice to set this option.

This silences the keying confirmation tone for silent keying operation.

To cancel the silent keying function:

(1) Press F 5 1 to re-invoke the function.

(2) Press ∧ to turn keying confirmation ON, then M+ twice to set this option.

The keying confirmation tone will return to its previous level.

The status of this function is held in memory, even after the power is turned off.

5.9 AUTOMATIC ANSWER FUNCTION

This function only operates during handsfree operation (in car mount use). When active, the function allows you to answer an incoming call without taking your hands off of the steering wheel. A call that rings for more than 6 seconds will automatically be connected, and conversation can commence.

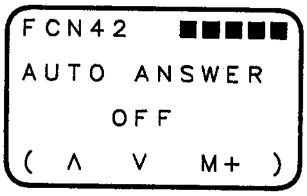
To switch the automatic answer function ON/OFF:

(1) Press F 4 2

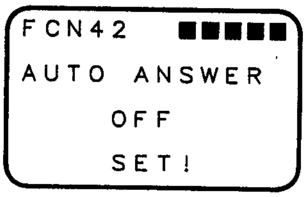
The current status is displayed.

(2) Press ∧ or ∨
to switch the function ON or OFF.

(3) Press M+ to confirm
this function.



FCN42 ■■■■■
AUTO ANSWER
OFF
(∧ ∨ M+)



FCN42 ■■■■■
AUTO ANSWER
OFF
SET!

5.10 ROAMING

When you switch your telephone ON, the HOME mobile network will automatically be selected, provided you are inside the service area of you HOME mobile network. You may also use your telephone on networks other than your HOME network. This is known as ROAMING.

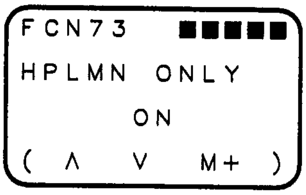
Your SIM contains a list of preferred networks, programmed by your dealer. If you switch your telephone ON, but are outside the service area of your HOME mobile network, the telephone will automatically search the list of preferred networks in your SIM in order to select an alternative network. This is automatic roaming. Once your telephone has selected a network, normal telephone functions become available.

5.10.1 HOME NETWORK ONLY

If you do not want your telephone to automatically check for other mobile networks, you may activate the HOME NETWORK ONLY function:

(1) Press [F] [7] [3] .

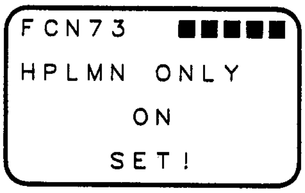
(2) Use the [Λ] [V] keys to activate or deactivate the function.



```
FCN73    ■■■■■
HPLMN ONLY
     ON
( Λ   V   M+ )
```

(3) Press [M+] to confirm the function.

The telephone will select only your HOME network until you deactivate this function.
If you are outside your HOME mobile network, your telephone will display 'NO SERVICE'.



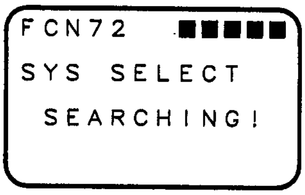
```
FCN73    ■■■■■
HPLMN ONLY
     ON
    SET!
```

5.10.2 TRANSFERRING TO ALTERNATIVE MOBILE NETWORKS

The F72 function, System Select, allows you to manually ROAM to any network, provided that you are within the network service area and there are no restrictions on that network. This function is only active when the telephone is in standby mode (NOT DURING CONVERSATION).

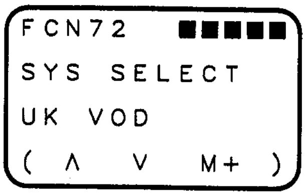
(1) Press [F] [7] [2] .

The telephone will search for alternative mobile networks.



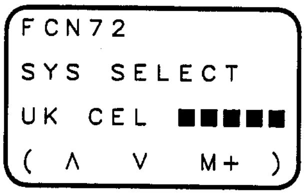
```
FCN72    ■■■■■
SYS SELECT
 SEARCHING!
```

The networks which your telephone identifies will be displayed.
Use the [Λ] , [V] keys to scroll.

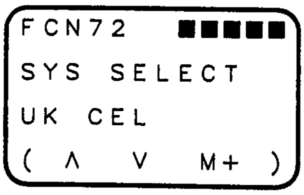


```
FCN72    ■■■■■
SYS SELECT
UK VOD
( Λ   V   M+ )
```

(2) To select an alternative network, scroll to the required network using [Λ] , [V] .

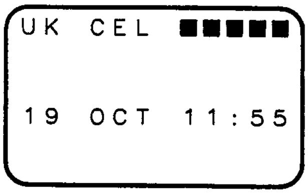


```
FCN72
SYS SELECT
UK CEL   ■■■■■
( Λ   V   M+ )
```



```
FCN72    ■■■■■
SYS SELECT
UK CEL
( Λ   V   M+ )
```

Press M+ .
The Handset display then changes to standby mode - call processing can now proceed under the selected mobile network.



UK CEL ■■■■■

19 OCT 11:55

This function will not be effective if the HOME NETWORK ONLY function is active.

Further details on the roaming function can be obtained from your authorised dealer.

5.11 SECURITY FUNCTIONS

Security of your GSM mobile telephone is provided by the Subscriber Identification Module (SIM), which is issued by the GSM Service Operator. The two possible formats of SIM, internal SIM or 'Smart Card' SIM were described in the introduction. Both provide the same security functions; preventing unauthorised use of the telephone by a third party.

The SIM uses number codes to provide security; the PIN and the Lock code. These codes should not be disclosed to anyone. If the codes are disclosed unintentionally, we recommend that you change them immediately, to prevent unauthorised use of your telephone.

Your Personal Identification Number (PIN) is stored on your SIM. It can be up to 8 digits, and provides authentication of your identity. Further security is provided by the automatic lock function, controlled by a Lock code, which allows only certain calls to be made from the telephone.

Note: Your telephone may make Emergency Calls for POLICE, AMBULANCE and FIRE regardless of its security status.

5.11.1 PIN SECURITY AT POWER ON

The PIN security feature is used at Power ON as a user authentication procedure to protect your telephone. Until the correct PIN has been entered all calls will be blocked, EXCEPT EMERGENCY CALLS.

You will be prompted to enter your PIN via the keypad. If the wrong PIN is entered, "INVALID" is displayed on the screen. You have 3 attempts to enter the correct PIN. If you fail to enter the correct PIN at the third attempt, the SIM will be "blocked". Your must now enter your 8 digit PIN Unblocking Key (PUK), issued by your dealer, to unblock your telephone. You have 10 attempts to enter the correct PIN Unblocking Key. If you fail to enter the correct code after the tenth attempt, you must contact your dealer.

5.11.2 AUTOMATIC LOCK FUNCTION

The automatic lock function enables you to limit the use of your telephone. Two lock modes are available:

(1) FULL LOCK - All outgoing calls are barred. Only incoming calls may be received.

(2) PARTIAL LOCK - Outgoing calls are barred, except from the stored number memory, received call memory and last 10 numbers dialled memory. Incoming calls will still be received.

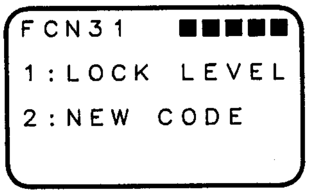
The automatic lock modes are controlled by a Lock code. Lock codes must be between 2 and 4 characters in length. Allowable characters are 0 to 9, #, *.

5.11.2.1 Changing the Lock Level

Automatic locking is activated by the function F31, Telephone lock.

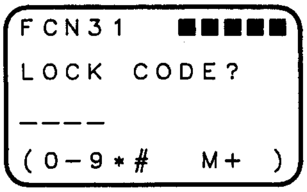
(1) Press **F** **3** **1** .

(2) Press **1** to select option 1, to change the lock level.



```
FCN31      ■■■■■
1:LOCK  LEVEL
2:NEW  CODE
```

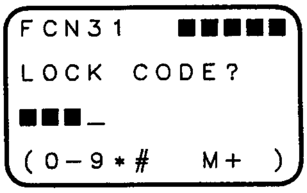
You will be requested to enter your 4 digit Lock code.



```
FCN31      ■■■■■
LOCK  CODE?
----
(0-9*#    M+  )
```

(1) Enter **LOCK CODE**

(2) Press **M+** to confirm the Lock code.



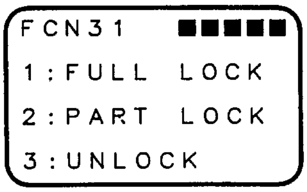
```
FCN31      ■■■■■
LOCK  CODE?
■■■_
(0-9*#    M+  )
```

You may now select the required Lock level by pressing:

1 for FULL LOCK.

2 for PART LOCK.

3 to UNLOCK your telephone.



```
FCN31      ■■■■■
1:FULL  LOCK
2:PART  LOCK
3:UNLOCK
```

Note: Whilst in either FULL LOCK or PARTIAL LOCK, you cannot write a telephone number to the stored number memory (001 to 999).

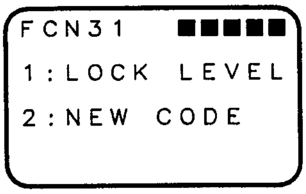
Lock status is memorised even after power is turned off, and becomes effective at the next Power ON, until the automatic lock function is released.

5.11.2.2 Revising Your Lock Code

The Lock code for your telephone will have been programmed by your dealer. However, you may revise your Lock code using the F31 function:

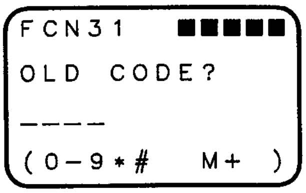
(1) Press **F** **3** **1**

(2) Press **2** to select option 2 to revise your lock code.



```
FCN31      ■■■■■
1:LOCK  LEVEL
2:NEW  CODE
```

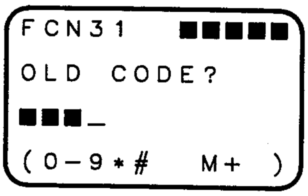
You will be prompted to enter your current (old) Lock code.



```
FCN31      ■■■■■
OLD  CODE?
----
(0-9*#    M+  )
```

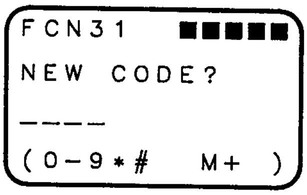
(1) Enter (OLD) LOCK CODE

(2) Press M+ to confirm your old code.



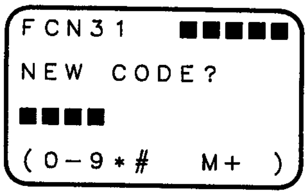
```
FCN31      ■■■■■
OLD  CODE?
■■■_
(0-9*#     M+  )
```

You will then be prompted to enter your new Lock code.



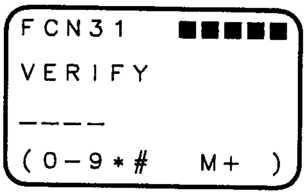
```
FCN31      ■■■■■
NEW  CODE?
----
(0-9*#     M+  )
```

(1) Enter NEW LOCK CODE



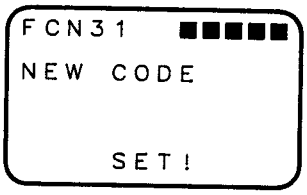
```
FCN31      ■■■■■
NEW  CODE?
■■■■
(0-9*#     M+  )
```

(2) Press M+ to confirm your new code.



```
FCN31      ■■■■■
VERIFY
----
(0-9*#     M+  )
```

(3) Press M+ again to verify your new code.



```
FCN31      ■■■■■
NEW  CODE

        SET!
```

The code has now been set in your telephone, until you choose to revise it.

Note: If the old Lock code is entered incorrectly, "INVALID" will be displayed and you must re-enter using the F31 function.

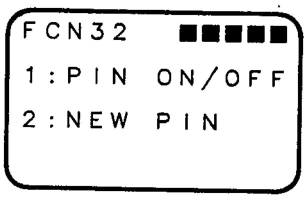
5.11.3 PIN CODE ACTIVATION/DE-ACTIVATION

This function can only be used when the PIN disabling function is active on your telephone. This may be arranged via your authorised dealer.

PIN code operations are performed using the F32 function.

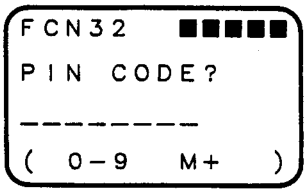
(1) Press F 3 2.

(2) Press 1 to select option 1.



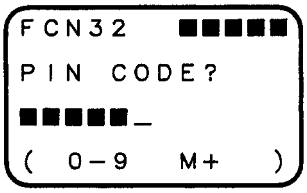
```
FCN32      ■■■■■
1:PIN  ON/OFF
2:NEW  PIN
```

You will be prompted to enter your PIN.



```
FCN32     ■■■■■
PIN  CODE?
________
( 0-9  M+   )
```

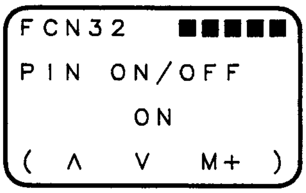
(1) Enter PIN



```
FCN32     ■■■■■
PIN  CODE?
■■■■■_
( 0-9  M+   )
```

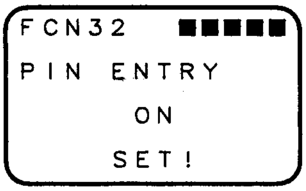
(2) Press M+ to confirm.

(3) You may now turn the PIN ON or OFF by pressing ∧ .



```
FCN32     ■■■■■
PIN  ON/OFF
      ON
( ∧  V   M+ )
```

(4) Press M+ to confirm PIN ON/OFF status.



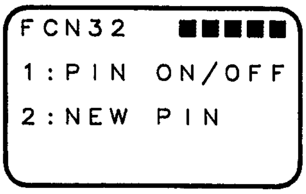
```
FCN32     ■■■■■
PIN  ENTRY
      ON
     SET!
```

5.11.4 CHANGING YOUR PIN

A PIN will have been programmed into your telephone SIM by your dealer. If your PIN is disclosed to another person, you should revise it immediately to prevent unauthorised use of your telephone. Alternatively, you may wish to change your PIN in order to remember it more easily. Changing your PIN is accomplished by the F32 function:

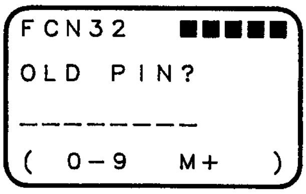
(1) Press F 3 2

(2) Press 2 to select option 2.



```
FCN32     ■■■■■
1:PIN  ON/OFF
2:NEW  PIN
```

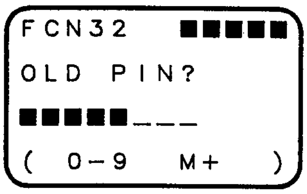
You will be prompted to enter your current (old) PIN.



```
FCN32     ■■■■■
OLD  PIN?
________
( 0-9  M+   )
```

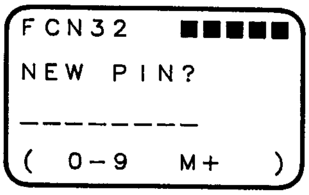
(1) Enter (OLD) PIN

(2) Press M+ to confirm your old PIN.



```
FCN32     ■■■■■
OLD  PIN?
■■■■■___
( 0-9  M+   )
```

You will then be prompted to enter your new PIN.

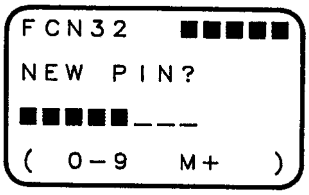


FCN32 ■■■■■

NEW PIN?

(0-9 M+)

(1) Enter NEW PIN



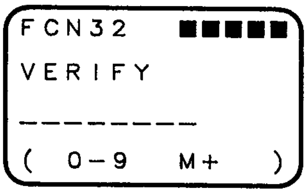
FCN32 ■■■■■

NEW PIN?

■■■■■___

(0-9 M+)

(2) Press M+ to confirm the new PIN.

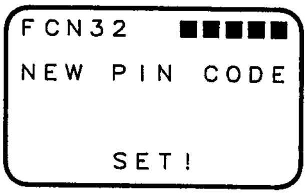


FCN32 ■■■■■

VERIFY

(0-9 M+)

(3) Press M+ again to verify the new PIN.



FCN32 ■■■■■

NEW PIN CODE

SET!

5.11.5 CALL RESTRICTIONS - NETWORK TELEPHONE OPERATOR

Using the automatic lock function described above it is possible to restrict, or even bar, outgoing calls. Call restrictions can also be implemented by the Network Telephone Operator, as described in this section.

Note: Call restrictions by the Network Telephone Operator are only available if you request this option from the service provider. If not, your request for the services described below will be ignored.

The Network Telephone Operator may implement the following outgoing call restrictions:

(1) Barring of all outgoing calls.

(2) Barring of outgoing international calls.

(3) Barring of outgoing international calls except those directed to the HOME mobile network country.

The Network Telephone Operator may implement the following incoming call restrictions:

(1) Barring of all incoming calls.

(2) Barring of incoming calls when roaming outside the HOME mobile network country.

These call restrictions are activated/deactivated, interrogated, or registered by informing the Network Telephone Operator of the required service code, and your password. The password is a 4 digit code used to identify, and authenticate, you to the operator. This service is only available if you have registered it with your dealer. Your dealer will issue you with your network password.

The service codes for each of the call restrictions are given in Table 5.2 below.

Table 5.2 Call Restriction Codes

CALL RESTRICTION	CODE
Barring of all outgoing calls	33
Barring of outgoing international calls	331
Barring of outgoing international calls (except those directed to the HOME Mobile Network)	332
Barring of all incoming calls	35
Barring of incoming calls (when roaming outside the HOME Mobile Network)	351

Further details of supplementary services, including call restrictions, may obtained from the service provider.

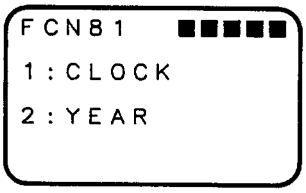
5.12 CLOCK/TIMER FUNCTIONS

5.12.1 CLOCK

The F81 function is used to set the date and time on your telephone.

(1) Press F 8 1

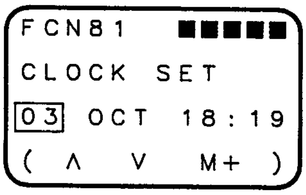
Clock and year selections are displayed.



```
FCN81   ■■■■■
1:CLOCK
2:YEAR
```

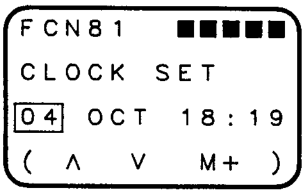
(2) Press 1 for clock mode

The date column will be highlighted for you to change if you require.



```
FCN81   ■■■■■
CLOCK SET
03 OCT  18:19
( ∧  ∨  M+ )
```

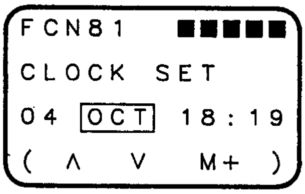
(3) Press ∧ until the date you require is displayed.



```
FCN81   ■■■■■
CLOCK SET
04 OCT  18:19
( ∧  ∨  M+ )
```

(4) Press M+ to set the date.

The month will now be highlighted.



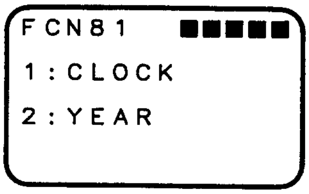
```
FCN81   ■■■■■
CLOCK SET
04 OCT  18:19
( ∧  ∨  M+ )
```

(5) Repeat steps (3) and (4) to set the month, hours and minute settings.

(6) Press any key, except ⏻ ☎ ∧ ∨ to return to the normal display.

(7) Press F 8 1

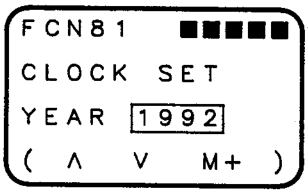
(8) Press 2 to change the year setting.



```
FCN81    ■■■■■
1:CLOCK
2:YEAR
```

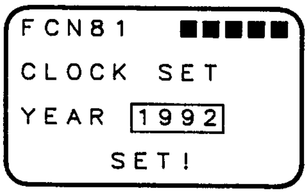
The current year will be highlighted for change if required.

(9) Press ∧ until the desired year is displayed.



```
FCN81    ■■■■■
CLOCK SET
YEAR 1992
(  ∧   ∨   M+  )
```

(10) Press M+ to set the year.



```
FCN81    ■■■■■
CLOCK SET
YEAR 1992
      SET!
```

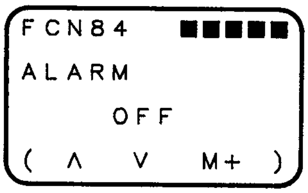
(11) Press any key except ⏻ 🔕 ∧ ∨ to return to the normal display.

5.12.2 ALARM TIME SETTING

The F84 function is used to activate/de-activate the alarm function and set the alarm time.

5.12.2.1 Activating Alarm

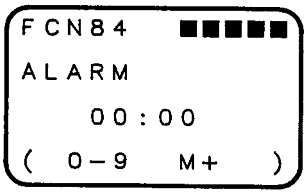
(1) Press F 8 4



```
FCN84    ■■■■■
ALARM
      OFF
(  ∧   ∨   M+  )
```

(2) Press ∨ to turn the alarm on.

The alarm time will be displayed.

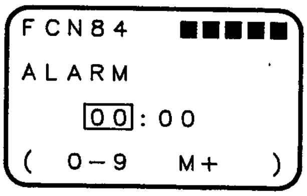


```
FCN84    ■■■■■
ALARM
     00:00
(  0-9   M+    )
```

5.12.2.2 Setting Alarm

(3) Press ∧ to change the setting.

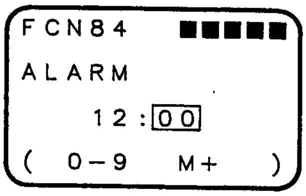
The hour column will be highlighted.



```
FCN84    ■■■■■
ALARM
     00:00
(  0-9   M+    )
```

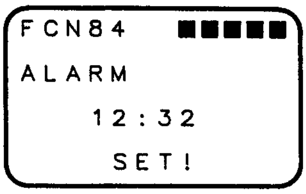
(4) Enter HOURS, then press M+

The minutes column will now be highlighted.



```
FCN84    ■■■■■
ALARM
     12:00
(  0-9   M+    )
```

(5) Enter [MINUTES] then press [M+]



```
FCN84   ■■■■■
ALARM
   12:32
    SET!
```

Once set, the alarm will sound, and the display will flash, at the same time each day unless it is de-activated, or the alarm time is changed.

5.12.2.3 De-activating Alarm

(1) Press [F] [8] [4]

(2) Press [∧] until the display reads OFF.

(3) Press any key, except [⏻] [🔕] [∧] [∨] to return to the normal display.

5.12.3 CALL LENGTH TIMER

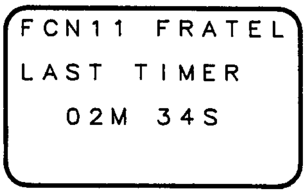
The call length timer facility may not be available on your telephone unless programmed by your authorised dealer. Please contact your dealer for further details.

5.12.3.1 Individual Call Length Timer

Function F11 enables you to display the talk time of your last call, or monitor the talk time of your present conversation.

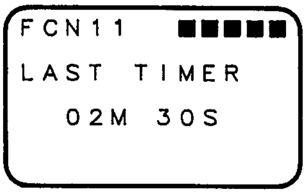
(1) Press [F] [1] [1]

The last call length display is given in minutes (M) and seconds (S).



```
FCN11  FRATEL
LAST  TIMER
  02M  34S
```

If this function is invoked during conversation, the length of the current call is displayed. The display is updated every 10 s.



```
FCN11   ■■■■■
LAST  TIMER
  02M  30S
```

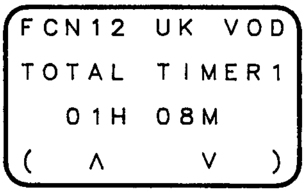
(2) Press any key except [⏻] [🔕] [∧] [∨] to return to the normal display.

5.12.3.2 Non-Resettable Cumulative Call Timer

Function F12 enables you to display the non-resettable cumulative call timer.

(1) Press [F] [1] [2]

A separate total call length time will be displayed for every country/mobile telephone network to which you are registered. "H" represents hours (00H to 99H) and "M" represents minutes (00M to 59M).



```
FCN12  UK  VOD
TOTAL  TIMER1
  01H  08M
(  ∧      ∨  )
```

(2) Use [∧] [∨] keys to scroll between different mobile networks.

```
FCN12  UK  CEL
TOTAL  TIMER1
  00H  23M
(  ∧      ∨   )
```

(3) Press any key except [⏻] [🔕] [∧] [∨] to return to the normal display.

5.12.3.3 Resettable Total Call Length Timer

Function F13 is used to enable the resettable total length timer. A separate total time can be displayed for every country/mobile telephone network, to which you are registered.

(1) Press [F] [1] [3]

(2) Use [∧] [∨] keys to scroll between different mobile networks.

```
FCN13  UK  CEL
TOTAL  TIMER2
  00H  13M
( ∧   ∨     0 )
```

(3) Press [0] to reset the time.

```
FCN13  UK  CEL
TOTAL  TIMER2
  00H  00M
( ∧   ∨    M+ )
```

(4) Press [M+] to confirm.

```
FCN13  UK  CEL
TOTAL  TIMER2
    RESET
(  ∧      ∨   )
```

(5) Press any key except [⏻] [🔕] [∧] [∨] to return to the normal display.

Note: The lapsed time of calls originated from your telephone, and incoming calls, may be monitored. The elapsed time for calls originated for individual country mobile networks may also be monitored. To make this selection, call your authorised dealer.

5.13 RADIO MUTE

Your telephone has the facility to mute your car radio when in car mount use. This facility must be installed by your authorised dealer.

For an incoming call, radio mute will start immediately prior to the ringing tone.

For an outgoing call, radio mute will start when you press [☎] .

Radio sound will be restored either when the conversation is completed, or if the ringing tone is terminated without entering conversation.

5.14 DTMF SIGNALLING

Each digit key on the telephone keypad (0 to 9, #, *) has a different tone, known as DTMF (Dual Tone Multiple Frequency).

You may need to send DTMF tones during conversation to access functions such as long distance access code, voice mail retrieval and other specific ISDN services. DTMF tones are sent directly from the keypad by pressing the appropriate keys.

DTMF tones may also be sent from a memory location 001 to 999 during conversation:

(1) Press [MR]

(2) Enter [MEMORY LOCATION (001 TO 999)]

(3) Press [☎]

Notes: 1. Digit keys with associated DTMF tones are 0 to 9, * and #. DTMF tones may not be sent by pressing the keys if the memory contents are displayed, or alpha input mode is selected.

2. If you are not in conversation when trying to send DTMF tones from a memory location, the automatic redial function will be activated.

5.15 LANGUAGE SELECTION

The language of the function guide, input characters at the alpha mode, and warnings on your telephone will default to the country language defined by your SIM. You may change the language with the F61 function:

(1) Press [F] [6] [1]

(2) Use the [Λ] [V] keys to scroll through 10 languages

```
FCN61   ■■■■■
LANGUAGE
   ENGLISH
( Λ  V   M+ )
```

(3) Press [M+] to confirm.

```
FCN61   ■■■■■
LANGUAGE
   ENGLISH
     SET!
```

Note: If this function is not activated for some reason (e.g. defective SIM) the telephone will default to English.

5.16 SOFTWARE CONTROLLED POWER ON/OFF SWITCH

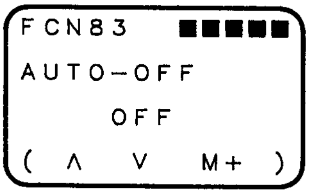
Your telephone is programmed to maintain an ongoing conversation, or call in progress, even if the [⏻] key is pressed, or the vehicle ignition is turned off. Power will remain on until the call is completed.

5.17 AUTOMATIC POWER OFF

To avoid unnecessary battery drain, an automatic Power OFF function is provided, function F83. When this function is active, power will automatically switch off 15 hours after the vehicle ignition is turned off. Power OFF will not occur if there is a conversation in progress.

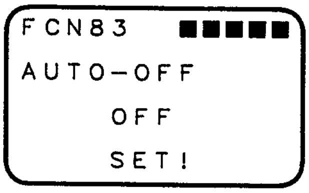
(1) Press F 8 3

(2) Use the keys ∧ and V to turn the function ON or OFF.



```
FCN83 ■■■■■
AUTO-OFF
   OFF
( ∧  V   M+ )
```

(3) Press M+ to confirm.

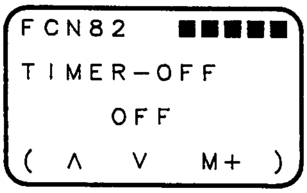


```
FCN83 ■■■■■
AUTO-OFF
   OFF
   SET!
```

5.18 POWER OFF TIMER

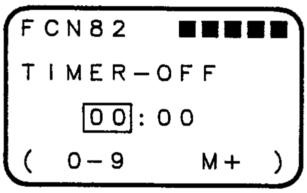
Function F82 enables you to automatically set the Power OFF time for your telephone.

(1) Press F 8 2



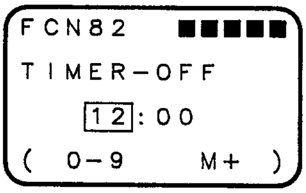
```
FCN82 ■■■■■
TIMER-OFF
   OFF
( ∧  V   M+ )
```

(2) Press V to set/change the time. The hours column will be highlighted.



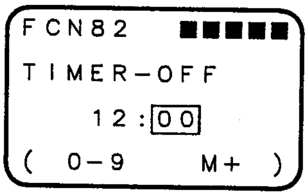
```
FCN82 ■■■■■
TIMER-OFF
   00:00
( 0-9    M+ )
```

(3) Enter HOURS for power OFF



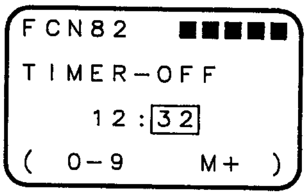
```
FCN82 ■■■■■
TIMER-OFF
   12:00
( 0-9    M+ )
```

(4) Press M+ to confirm. The minutes column will now be highlighted.



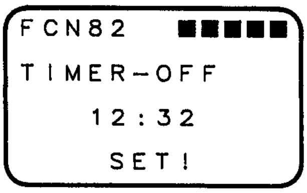
```
FCN82 ■■■■■
TIMER-OFF
   12:00
( 0-9    M+ )
```

(5) Enter MINUTES for power OFF.



```
FCN82 ■■■■■
TIMER-OFF
   12:32
( 0-9    M+ )
```

(6) Press M+ to confirm.



```
FCN82  ■■■■■
TIMER-OFF
  12:32
  SET!
```

The power OFF time will remain displayed until any key is pressed.

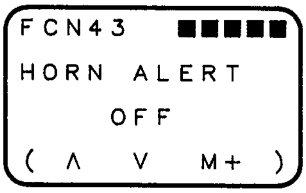
Note: This function will be activated at the same time each day until de-activated/changed.

5.19 HORN ALERT

The horn alert function, F43, is used to alert you to incoming calls, if you are away from your vehicle. The horn of the vehicle will sound for 20 seconds to summon your attention.

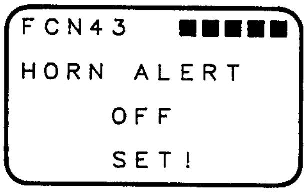
(1) Press F 4 3

(2) Use Λ V to turn the function ON/OFF.



```
FCN43  ■■■■■
HORN ALERT
   OFF
( Λ  V  M+ )
```

(3) Press M+ to set.



```
FCN43  ■■■■■
HORN ALERT
   OFF
  SET!
```

Notes: 1. This function is only available, if the optional Horn Alert Kit is installed (refer to Chapter 2).

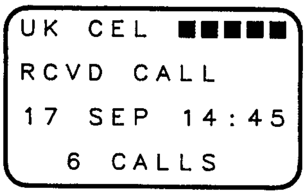
2. When you set this function, the telephone will remain powered on for 15 hours after the vehicle ignition is turned off.

3. Observe in-country rules concerning the use of horns. For example, in the United Kingdom, this function can ONLY be used on farm vehicles.

5.20 RECEIVED CALL INDICATOR

Your telephone can store the details of up to 10 unanswered incoming calls. The received call information is displayed when the vehicle ignition is turned ON, or while the Power OFF timer is functioning when the ignition is turned OFF, and in transportable use.

The number of calls since the last key input will be displayed, and the telephone number of the calling parties will be memorised, if this information is available form the GSM mobile network.

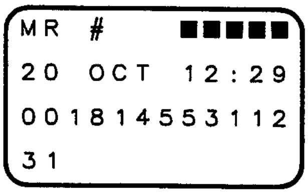


```
UK CEL  ■■■■■
RCVD CALL
17 SEP 14:45
 6 CALLS
```

To display the latest received call information:

(1) Press [MR] [#]

(2) The [∧] [∨] keys will enable you to scroll through call information.



```
MR  #        ■■■■■
20  OCT    12:29
001814553112
31
```

For incoming call telephone numbers with more than 24 digits, the overflow digits can be displayed by pressing the [F] key twice, holding down the second key press.

To cancel this function, press any key except [⏻] , [🔕] , [∧] or [∨] .

Note: If the power to the telephone is turned OFF and then ON, the Received Call Indicator will be turned OFF, and automatically cancelled.

5.21 CALLED NUMBER DISPLAY

The telephone will display your dialled, or recalled, telephone number whether it is entered by normal dialling, from the stored number memory, scratch pad memory or received call memory. However, if using the last number dialled function, the dialled number will only be displayed after pressing [☎] .

5.22 AUTOMATIC INTERNATIONAL ACCESS CODE

The Automatic International Access Code is used to make an International Call .

(1) Press [+] , then enter the international country code (e.g. 44 for the UK).

(2) Enter [TELEPHONE NUMBER]

(3) Press [☎] .

Notes: 1. "+" can be memorised in all memories.

2. The "+" key for international calls precedes the number. The "+" key for pause dialling is placed in-between dialled numbers.

5.23 AUTOMATIC REDIAL

Automatic Redial is initiated following a failed call request due to:

(1) Busy Destination.

(2) Unobtainable Destination: Temporary.

(3) Unobtainable Destination: Permanent or Long Term.

The number of allowed redials, and redial intervals, are dependent upon the cause of the call failure.

For busy destination, or temporary unobtainable destination, a maximum of 10 redials can be attempted:

(1) The first redial will start 5 seconds from a call failure after [☎] is pressed.

(2) If the call fails again, a 2nd and 3rd redial will be made at 1 minute intervals.

(3) Up to 10 redials will be made at 3 minute intervals.

For a permanent, or long term unobtainable destination, only one redial will be attempted, 5 seconds after the first call failure.

When the redial is a pause dialled number, the redial for the failed call will not proceed beyond the next pause dial code (P).

When a call fails, a warning tone will be heard, for example Busy Tone, Congestion Tone.

5.24 INDICATING TONES

The following is a list of the tones which you may hear from your telephone:

(1) Wake-up Tone: A half second tone which sounds at Power ON.

(2) Key-in Tone: A dual tone which sounds when a numbered key is pressed. (Each numbered key has a different tone known as DTMF.)

(3) Confirmation Tone: A single tone when a function key is pressed.

(4) Ringing Tone: A one second dual tone, repeated at 4 second intervals, when an incoming call is awaiting your answer.

(5) Intercept Tone: A rapid alternating high/low tone when a call, which you originate, is rejected. This may be because of a user error, or because the system is otherwise unable to accept the call.

(6) Re-order Tone: A rapid dual tone every other 1/4 second when the system cannot accept the call and suggests redialling, or the call is dropped. This can be caused by the other party clearing down, or if you are in an area of weak signal strength.

(7) Dropped Call Warning Tone: When your call is dropped during conversation, this tone will sound for 5 seconds. The warning tone will stop when you press ☎, or the Handset is placed on-hook. The IN USE display will not clear until the warning tone stops, even if your call has ended.

5.25 TRANSPORTABLE USE

5.25.1 CHANGING TO/FROM TRANSPORTABLE USE

The procedure for changing to TRANSPORTABLE USE is outlined below. For more comprehensive details, refer to Chapter 4 (for installation instructions) and to Chapter 2 (for associated assembly drawings).

(1) If the telephone is currently in car mount use, switch the telephone OFF (⏻ key), and disconnect the Handset from the Handsfree Cradle (the cable utilises a 'snap-fit' connector, press down the locking lever on the plug). Then remove the Transceiver from the mounting tray by releasing the movable hook and rotating the Transceiver up and out of the tray.

(2) Engage the grooves of the Transceiver with the fixed hooks of the Transportable Case and rotate the Transceiver down into the case. Lock the Transceiver into position using the large captive locking screw situated in the middle of the Handset recess (on the reverse side).

(3) Engage the Handset connector, into the associated connector slot in the Transceiver body.

(4) Clip the Handset to the stowage provided on the Transportable Case body.

(5) Fit the battery pack by engaging the fixed hooks into the associated slots on the Transportable Case, and rotating the battery pack down onto the case, clicking it firmly into position.

(6) If required, connect an external power supply to the Transceiver power supply connector: vehicle battery power may be applied via the cigarette lighter plug/cable assembly, alternatively the AC-DC converter may be used.

Notes: 1. The cigarette lighter plug/cable assembly (5 A fuse) should only be connected to a 12 V negative ground socket.

2. Ensure that you use the correct plug on your cigarette lighter cable, either flange or straight type. The plug can easily be unscrewed and changed. If the wrong plug is used, the cable may drop out, or the cigarette lighter fuse may blow.

(7) The telephone is now ready for use in transportable mode. To operate, simply lift the Handset by gently pulling it away from the Transportable Case, and press the ⏻ key. Telephone functions are now available, as described in this operating guide.

Notes: 1. If the telephone does not operate normally when you turn the power on, the battery pack may need to be charged.

2. It is recommended that the battery is recharged directly after use.

To revert to in car use, switch the telephone OFF (⏻ key) and disconnect any external power supply. Disconnect the Handset cable from the Transceiver (press down the locking lever on the Handset plug), and remove the Transceiver from the Transportable Case (release the large captive locking screw and lift out the Transceiver). Re-install the Handset and Transceiver into the vehicle as described in Chapter 4 (Installation).

5.25.2 USING TRANSPORTABLE CASE IN CAR

(1) Ensure that the telephone is Switched OFF (⏻ key).

(2) Connect the car mounted external cellular mobile antenna to the antenna connector on the side of the Transceiver.

(3) Connect the cigarette lighter plug/cable assembly between the power connector of your Transceiver and your vehicle's cigarette lighter socket. Make sure that the correct plug is used for your particular cigarette lighter socket.

(4) The telephone is now ready for use. To operate, simply lift the Handset by gently pulling it from the Transportable Case, and press the ⏻ key.

5.25.3 REMOVING THE BATTERY PACK

(1) Ensure that the telephone is switched OFF (⏻ key).

(2) Push the battery release button downwards: it is located on the Transportable Case between the battery pack and the Handset recess. The battery pack will spring up. Carefully lift the battery pack away from its mounting.

5.25.4 BATTERY CHARGING

The battery pack can be charged both at your home or office, and in your vehicle. The battery pack and Transceiver must be fitted to the Transportable Case for charging.

5.25.4.1 Charging at Home or Office

(1) Connect the AC-DC converter to the Transceiver power connector. The AC-DC converter will power the Transceiver or charge the battery indefinitely while connected to the mains supply. For details refer to the operating instructions supplied with the AC-DC converter.

5.25.4.2 Charging in Your Vehicle

(1) Connect the power supply cable or cigarette lighter plug/cable assembly to the Transceiver power connector. The power will be supplied from the vehicle battery, and trickle charging will commence automatically. The battery pack will be fully charged in approximately 10 hours.

Notes:
1. The battery pack will be charged in approximately 10 hours whether the power of the telephone is ON or OFF. Charging will temporarily stop while in conversation.
2. Even if the power of the telephone is OFF, there is a slight current drain for memory back-up from the transportable battery, when the power is not supplied from the car battery.
3. There are cases in which the battery cannot be fully charged if the temperature is low. This is to protect the battery.

WARNING

The use of any accessories (battery charging equipment) other than Transportable Case or the optional DC Rapid Charger may cause damage to your telephone, or result in inferior performance. Panasonic is not responsible for any damage caused by the use of non-approved accessories.

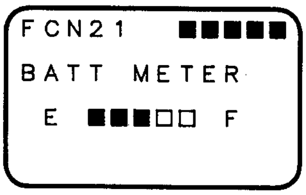
5.25.5 BATTERY FUNCTIONS

5.25.5.1 Battery Remainder Indication

The F21 function provides a 5 step bar indication of the battery remaining level.

(1) Press [F] [2] [1] .

All five bars indicates a full battery. If only 1 bar is lit, the low battery alarm is initiated followed by the automatic Power OFF function (see below).



```
FCN21   ■■■■■
BATT METER
 E ■■■□□ F
```

E = Empty
F = Full

5.25.5.2 Low Battery Alarm

The telephone will alert you when the battery level is reduced to the Low Battery Alarm Level (battery remainder indicator at Level 1 or less).

The alarm tone sounds a three beep tone from the speaker (1 second ON, 5 seconds OFF), giving you time to complete your conversation. The tone is repeated if the low battery level condition continues.

An indication of the Low Battery Voltage will be displayed, and the display will flash.

All key inputs are invalid except [⏻] until the battery pack is charged, or a new battery pack fitted, following which the Low Battery Status will be released. When the Low Battery status is released, the alarm tone and flashing display will cease.

5.25.5.3 Automatic Power Off

The telephone is automatically switched OFF when the battery level falls to Level 0. The battery pack must be replaced, or charged to battery indicator Level 1 or greater, following which the telephone can be switched ON using the ⏻ key.

5.26 TROUBLESHOOTING

In the event of a suspected malfunction, check the following prior to performing any servicing actions.

5.26.1 HANDSFREE CAR MOUNT USE

(1) Symptom: NO POWER. Check the following:

  (a) Ensure that the Handset curly cord is fully engaged into the Handsfree Cradle Unit.

  (b) Ensure that the Transceiver Unit is fully engaged into the mounting tray, and all cables are properly connected.

  (c) Check all fuses and wiring leading to the mobile telephone. Ensure that no connections are loose, disconnected or damaged, and that no fuses are blown.

5.26.2 TRANSPORTABLE USE

(1) Symptom: NO POWER. Check the following:

  (a) Ensure that the Transceiver Unit is fully engaged into the Transportable Case Unit, and the Handset curly cord is firmly engaged into the receptacle on the Transceiver Unit body.

  (b) Ensure that the battery pack is installed properly, and that is has been fully charged using the internal charging unit of the Transportable Case, or the optional DC Rapid Charger.

  (c) Ensure that the correct cigarette lighter plug is used for the particular vehicle: using an incorrect plug may cause the cigarette lighter accessory fuse to blow on some vehicles.

5.26.3 HANDSFREE CAR MOUNT USE AND TRANSPORTABLE USE

(1) Symptom: "NO SVC (NO SERVICE)" indication. Check the following:

  (a) Try moving to a different location: depending on the local terrain, the signal may be blocked i.e. you are in a communication 'dead spot'.

  (b) Check the antenna and connector. Ensure that the connector is firmly threaded onto the associated connector on the Transceiver Unit body: hand-tighten only.

Chapter 5

6. PRÜFBEFEHLE

6.1 EINFÜHRUNG

Dieses Kapitel enthält Informationen über die in das GSM Mobiltelefon eingebaute Einrichtung für technische Funktionsprüfungen. Die Prüffunktion bietet eine Anzahl von Prüfbefehlen, die über das in den Hörer integrierte Tastenfeld eingegeben werden und verschiedene Bereiche des Mobiltelefons testen.

6.2 EINRICHTUNG FÜR TECHNISCHE FUNKTIONSPRÜFUNGEN

Die Funktionen der technischen Prüfeinrichtung ermöglichen, daß verschiedene Komponenten der Sender/Empfänger-Einheit zu Testzwecken durch die MMI (Man Machine Interface = Benutzerschnittstelle) getrennt aktiviert werden. Sämtliche Prüfbefehle werden über das in den Hörer integrierte Tastenfeld eingegeben. Um auf die Prüffunktionen zugreifen zu können, ist das Passwort-Test-Kabel erforderlich. (Siehe Abb. 6.1.)

6.2.1 STARTEN DES PRÜFMODUS

Um den Prüfmodus zu aktivieren gehen sie folgendermaßen vor:

(1) Schließen Sie das Prüfkabel an die Sender/Empfänger-Einheit an.

(2) Schalten Sie das Gerät ein.

(3) Geben Sie die in Tabelle 6.1 aufgeführte Tastenfeldsequenz ein, um den Prüfmodus aufzurufen.

(4) Gehen Sie nun zur Initialisierung des Mobiltelefons über.

Die verschiedenen zum Prüfen des Mobiltelefons angebotenen Befehle können jetzt benutzt werden (Siehe Abb. 6.1 für weitere Einzelheiten).

Um den Prüfmodus zu verlassen, drücken Sie [☎], und das Mobiltelefon kehrt in die normale Betriebsart zurück.

Tabelle 6.1 Prüfbefehle

BEFEHL	GRUPPE	TASTENFELDEINGABE	FUNKTION
Prüfmodus aufrufen	0	[F] [+] [☎]	Prüffunktion aufrufen. Prüfmodus beenden.
Initialisieren	1	[0] [0] [☎]	Sender/Empfänger-Einheit mit den folgenden Voreinstellungen initialisieren: 1. RF-Vorgang deaktivieren (sowohl Rx als auch Tx). 2. Stromzufuhr auf Minimum einstellen. 3. Rx Audio abschalten. 4. Tx Audio abschalten. 5. ASICs initialisieren. 6. Frequenzspringen deaktivieren. 7. Synthesizer CH 62 laden 8. Zeitkanal 0 auswählen. 9. DTMF und Audiosignale deaktivieren. 10. DTX deaktivieren.

Tabelle 6.1 Prüfbefehle (Fortsetzung)

BEFEHL	GRUPPE	TASTENFELDEINGABE	FUNKTION
Synthesizer laden	2	1 0 ☎ X X X ☎	Synthesizer mit den folgenden Kanaldaten laden, wobei XXX für die Kanäle 1- 124 steht
DTX MODUS		1 1 ☎	Ändert den aktuell ausgewählten Status der diskontinuierlichen Tx (Sendung) durch Umschalten zwischen Ein und Aus.
ENERGIEZU-STAND	3	2 0 ☎ X X ☎	Stellen Sie den für die Daten relevanten Energiedämpfpegel mit folgendem Befehl ein. XX Energiepegel dBm 02 2 Max 39 03 3 37 04 4 35 05 5 33 06 6 31 07 7 29 08 8 27 09 9 25 10 10 23 11 11 21 12 12 19 13 13 17 14 14 15 15 15 Min 13
Trägerfrequenz EIN/AUS		2 1 ☎	Ändert den Status der Trägerfrequenz durch Hin-und-Herschalten zwischen Ein und Aus.
Modulator EIN/AUS		2 2 ☎	Steuert die Modulation der Trägerfrequenz durch Hin-und-Herschalten zwischen Ein und Aus.
Tx-Daten		2 3 ☎ X ☎	Wenden Sie die Modulationsdaten an, um entweder eine maximale oder eine minimale Phasenumschaltung der Ausgangsträgerfrequenz zu erzeugen. X Funktion 0 Tx-Test beenden 1 Tx alle 0 (max. Mod.) 2 Tx alle 1 (max. Mod.) 3 Tx 1 & 0 abwechselnd (min. Mod.)
Zeitbasisüberwachung		24 ☎ X ☎	Die aktuelle Zeitkanalposition durch Vor- oder Zurücksetzen der Intervalle eines Zeitkanals. X Funktion 0 1 Zeitkanal vorsetzen. 1 1 Zeitkanal zurücksetzen.

Tabelle 6.1 Prüfbefehle (Fortsetzung)

BEFEHL	GRUPPE	TASTENFELDEINGABE	FUNKTION
DOPPLERÜB -ERWACH -UNG		2 5 ☎ X X X ☎	Aktiviert die Referenzfrequenz, damit sie, durch Benutzung von 256 Inkrementalschritten zur Kompensation des Dopplereffekts, der auftreten kann, wenn das Mobiltelefon mit höherer Geschwindigkeit bewegt wird, exakt justiert werden kann. X X X 0 0 0 bis 2 5 5
RSSI MESSEN und BIT ERROR COUNT (BEC)	4	3 0 ☎ X X X ☎	Zeigt die, in dem durch die XXX - Daten angegebenen Kanal, gemessenen RSSI & BEC an, (1 bis 124). X X X 0 0 1 bis 1 2 4
AUTO-MATISCHE VERSTÄR-KUNG EINSTELLEN		3 1 ☎ X ☎	Steuern Sie die automatische Verstärkung bezüglich der X-Daten unabhängig. X GAIN X GAIN 0 0 4 32 1 8 5 40 2 16T 6 48 3 24 7 56
DTMF EIN	5	4 0 ☎ X ☎	Aktivieren Sie das für die X-Daten des Tastencodes relevante DTMF-SIGNAL, das dem Befehl folgt. Die einer Taste zugeteilte Frequenz 1 1209 Hz & 697 Hz 2 1336 Hz & 697 Hz 3 1477 Hz & 697 Hz 4 1209 Hz & 770 Hz 5 1336Hz & 770 Hz 6 1477 Hz & 770 Hz 7 1209 Hz & 852 Hz 8 1336 Hz & 852 Hz 9 1477 Hz & 852 Hz * 1209 Hz & 941 Hz 0 1336 Hz & 941 Hz # 1477 Hz & 941 Hz
DTMF AUS		4 1 ☎	DTMF-Generator deaktivieren.

Tabelle 6.1 Prüfbefehle (Fortsetzung)

BEFEHL	GRUPPE	TASTENFELDEINGABE	FUNKTION
Sprach-Endl-osschleife		4 2 ☎ X ☎	Wandelt die Sprache entweder in eine Daten- oder in eine Analog-Endlosschleife um, um die Prüfung des Audioweges zu ermöglichen. X Prüftyp 0 Schleifentest beenden 1 Analog Audio Endlosschleife (ANLP) 2 Digital Audio Endlosschleife (DIGLP) 3 Daten-Endlosschleife (DTLP) 4 Schleifentest (wird während des Systemtests benutzt) 5 Wählt den Kodiererausgang und den Decoder Eingangs-Schleifentest aus.
Software Version		5 0 ☎	Software abfragen und die Versionsnummer anzeigen.
ADC-Daten erhalten	7	6 0 ☎ X d ☎	Entweder Batterietemperatur- oder Batteriespannungsdaten, zur Analyse anzeigen. X Funktion 0 Anzeige beenden 1 Spannungsdaten 2 Temperaturdaten X YY - angezeigte Daten X: 0 - Spannung, 1 - Temp. YY: ADC-Daten in HEX
Steuerung der externen Anschlüsse		6 1 ☎ X ☎	Externen Anschluß aktivieren aktivieren, um die richtigen Daten für die ausgewählte Funktion auszugeben. X Funktion 0 In den Ausgangszustand zurückkehren 1 Freisprechanschluß O/P H 2 Freisprechanschluß O/P L 3 Radio-Abschaltanschluß O/P H 4 Radio-Abschaltanschluß O/P L 5 Klingelsignalanschluß O/P H 6 Klingelsignalanschluß O/P L

Tabelle 6.1 Prüfbefehle (Fortsetzung)

BEFEHL	GRUPPE	TASTENFELDEINGABE	FUNKTION
STATUS		6 2 ☎	Die aktuellen Betriebsbedingungeen in einem Zehn-Bit-Wort anzeigen. xx xx xx xx xx Diverses. Siehe Tabelle unten AFC-Einstellung, 00 bis FF (0-255) Zeitkanal, 0 bis 7 Energiezustand, 2 bis F (2 bis 15) Kanalnummer, 00 bis FF, konvertieren von Hex. Diverses Bit 0 Modulator Ein/Aus, 1 =Ein Bit 1 Diskontinuierliches Tx Ein/Aus, 1 = Ein Bit 2 Abschalten/Abschalten rückgängig, 1 = Abschalten Bit 3 Im Auto eingebaut/ Tragbar, CM =1, TP = 0 Bit 4 Freisprecheinrichtung vorhanden, vorhanden = 1, Nicht vorhanden = 0
Mobiltelefon -System-daten erhalten	8	7 0 ☎ X0 X1 ☎	Sehen Sie die im EEPROM gespeicherten Systemdaten einsehen. Matrix benutzen, um zu lokalisieren: Systemdaten X1 0 X0 0 V35 1 T3 2 TA FLAG 3 4 Hinweis: Diese Systemdaten können nicht geändert werden.

Tabelle 6.1 Prüfbefehle (Fortsetzung)

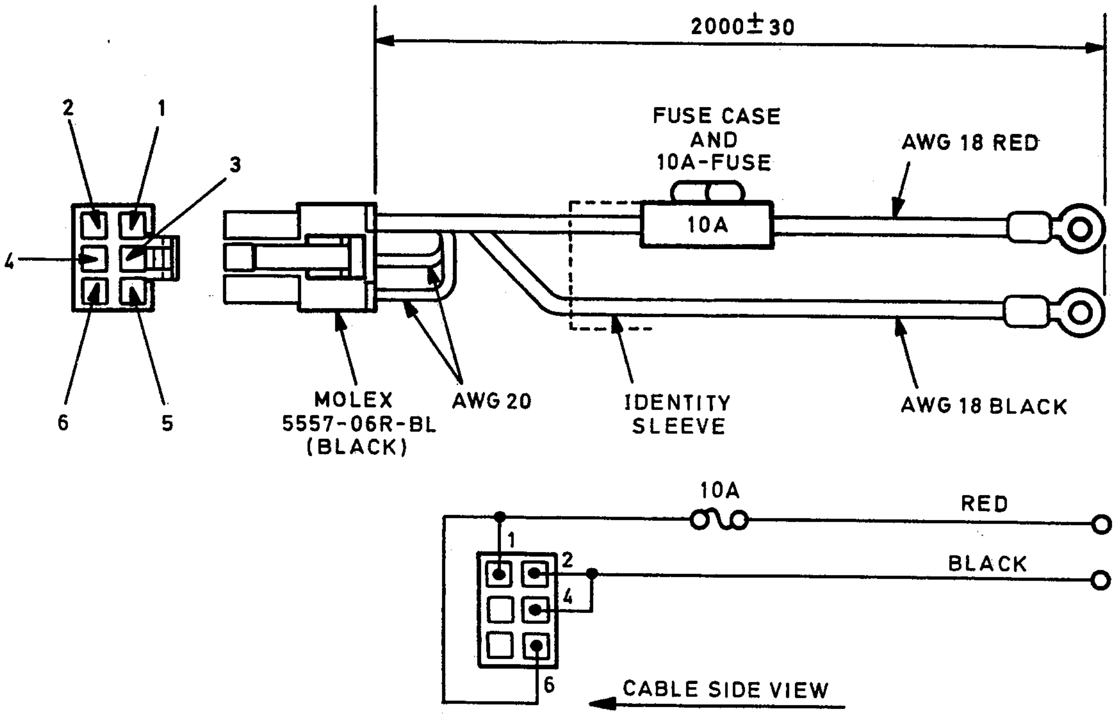
BEFEHL	GRUPPE	TASTENFELDEINGABE	FUNKTION
Mobiltelefon -Benutzerdaten erhalten		[7] [0] [☎] [X0] [X1] [☎]	Sehen Sie die im EEPROM gespeicherten Benutzerdaten ein. Matrix benutzen, um zu lokalisieren: Systemdaten X1 0 X0 5 Sperrdaten 6 xxxxx └┴┴┴── Sperrcode └──── Sperrstatus 0 = nicht gesperrt 1 = ein Teil gesperrt 2 = komplett gesperrt Hinweis: Um den nicht gesperrten Modus auszuwählen, wird der 4-Ziffer-Sperrcode ausgelassen.
Mobiltelefon -daten programmieren		[7] [1] [☎] [X0] [X1] [☎] [X] [X] [X] [X] [X] [Y] [☎]	Ändern der im EEPROM gespeicherten benutzerdefinierbaren Daten: X1 0 X0 5 Sperrdaten xxxxx : Siehe Obiges für Definition.

6.3 FEHLERCODE-ÜBERSICHT

In Tabelle 6.2 sind die Fehlercodes aufgelistet, die gegebenenfalls im Telefonhörer angezeigt werden, um einen Fehlerzustand zu identifizieren.

Table 6.2 Fehlercode-Übersicht

FEHLERCODE	BESCHREIBUNG
01	Prüfsumme (EPROM)
02	EEPROM Leer (Keine serielle Nummer)
03	EEPROM Prüfsumme
04	EEPROM Lese/Schreibe
05	SIM I/F
06	TIM
07	ANA
08	RAM
09	Software
10	PA Vorwärtsleistung
11	PA Rückwärtsleistung
12	ANA Interrupt
13	Synthesizer Bus
14	Synthesizer Interrupt
15	EQU Bus
16	EQU Interrupt


2000±30
2
1
3
4
6
5
FUSE CASE AND 10A-FUSE
10A
AWG 18 RED
MOLEX 5557-06R-BL (BLACK)
AWG 20
IDENTITY SLEEVE
AWG 18 BLACK
10A
RED
1
2
4
BLACK
6
CABLE SIDE VIEW

IDENTITY SLEEVE

PART No. MCST-0001GB01 TITLE: GSM PASSWORD CABLE	HEATSHRINK SLEEVE TO IDENTIFY CABLE

Abbildung 6.1 Spezialprüfkabel

7. DEMONTAGEANLEITUNG

7.1 EINFÜHRUNG

Dieses Kapitel enthält Anweisungen zur Demontage der Hauptkomponenten des GSM Mobiltelefonsystems, die nachfolgend aufgeführt sind:

(1) Freisprech-Gabeleinheit.

(2) Telefonhörereinheit.

(3) Tragbare Gehäuseeinheit.

(4) Sender/Empfänger-Einheit.

WARNUNG

Die in diesem Handbuch beschriebene Ausrüstung enthält polarisierte Kondensatoren, die flüssiges Electrolyt verwenden. Diese Teile sind vollkommen sicher, vorausgesetzt, es kommt weder zu einem Kurzschluß noch zu einem Anschluß mit entgegengesetzter Polarität an einem der Kondensatoranschlüsse. NICHTBEACHTUNG DIESER WARNUNG KÖNNTE ZU SCHÄDEN AN DER AUSRÜSTUNG FÜHREN ODER, SCHLIMMSTENFALLS, PERSONEN DURCH EINEN ELEKTROSCHOCK ODER DURCH EINE EXPLOSION EINES BESCHÄDIGTEN KONDENSATORS VERLETZEN, WENN MIT DIESEN GERÄTEN UMGEGANGEN WIRD, IST ÄUSSERSTE VORSICHT NÖTIG.

WARNUNG

1. Die Sender/Empfänger-Einheit, die Telefonhörer- und Freisprech-Gabeleinheit enthalten Vorrichtungen (ESDs), die durch eine elektrostatische Entladung - ausgelöst durch fehlerhafte Handhabung - beschädigt werden können. Jedesmal wenn die einzelnen Einheiten auseinandergebaut werden, müssen die antistatischen Vorsichtsmaßnahmen eingehalten werden. Beachten Sie die anschließend aufgeführten ESD-Handhabungsvorkehrungen.

2. Die Demontageanleitung beschreibt, wie man Gehäuse und interne Einrichtungen, aus denen Telefonhörer- und Telefongabeleinheit bestehen, demontiert. Die Gehäuse werden aus Spritzgußplastikteilen hergestellt; es ist daher wichtig, die vorgegebenen Anweisungen einzuhalten, um eventuelle Schäden an den Einheiten zu vermeiden. Benutzen Sie unter keinen Umständen irgendwelche Gerätschaften, um die Gehäuse mit Gewalt zu entfernen.

7.2 ESD-HANDHABUNGSVORKEHRUNGEN

Bevor mit dem Zerlegen begonnen wird, müssen folgende antistatische Vorsichtsmaßnahmen eingehalten werden, um eventuellen Schäden vorzubeugen.

7.2.1 SPEZIELLER ARBEITSBEREICH (SAB)

Es muß ein Arbeitsbereich vorhanden sein, an dem elektrostatisch empfindliche Geräte sicher gehandhabt werden können, d.h. ohne Risiko einer Beschädigung durch elektrostatische Entladungen. Der Bereich muß folgendermaßen ausgestattet sein:

(1) Arbeitsflächen - Alle Arbeitsflächen müssen mit einer ladungsableitenden Arbeitsmatte ausgerüstet sein - SICHER FÜR DAS ARBEITEN MIT AUSRÜSTUNG, DIE UNTER SPANNUNG STEHT - die über einen 1 MΩ Widerstand (normalerweise in die Leitung zwischengeschaltet) an eine Erdungsleitung angeschlossen ist.

(2) Armband - Es handelt sich hierbei um ein schnell an- und abzulegendes Armband mit direktem Hautkontakt, der über eine bewegliche Schnur mit einem Sicherheitswiderstand zwischen 5 kΩ und 1 MΩ an eine ladungsabführende Erdungsleitung angeschlossen und unbedingt verwendet werden sollte.

(3) Behälter - Alle Behälter und Förderungsreinrichtungen müssen leitend sein.

7.2.2 SAB-ÜBERPRÜFUNG

Es ist die Aufgabe eines jeden Wartungstechnikers, die Armbänder und die Schnur einmal wöchentlich auf ihre Funktionsfähigkeit hin zu überprüfen.

7.3 FREISPRECH-GABELEINHEIT

Folgendes Verfahren ist eine Anleitung dafür, wie man die Telefongabeleinheit Schritt für Schritt auseinanderbaut, um auf die Flachbaugruppe für Reparatur- oder Austauschzwecke zugreifen zu können. Für Einzelheiten zur Demontage bitte Abbildung 7.1 und die Darstellung in aufgelösten Einzelteilen in Kapitel 11 einsehen.

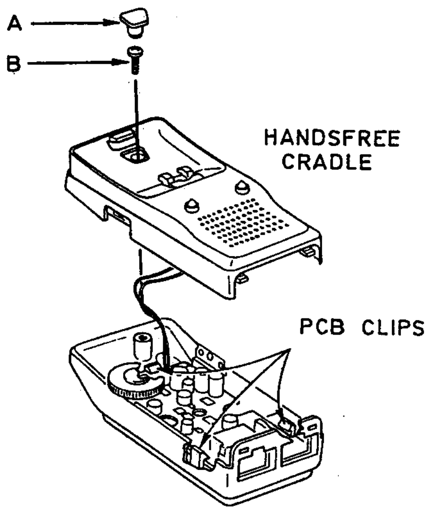


Abbildung 7.1 Demontage der Freisprech-Gabeleinheit

(1) Gummistöpsel (A) und Schraube (B) von dem Gehäuse entfernen.

(2) Beide Hälften durch Lockern und anschließendes Herausheben der oberen Gehäusehälfte voneinander trennen.

(3) Das Lautsprecherkabel aus Anschluß P802 der Flachbaugruppe (pcb) herausziehen.

(4) Die drei Klammern, die die Flachbaugruppe festhalten und neben den Anschlüssen J801, J803 und J802 angebracht sind, vorsichtig zurückbiegen und die Flachbaugruppe herausnehmen.

7.4 TELEFONHÖREREINHEIT

Folgendes Verfahren ist eine Anleitung dafür, wie man die Telefonhörereinheit Schritt für Schritt auseinanderbaut, um auf die internen Komponenten zwecks Reparatur oder Austausch zugreifen zu können. Bevor Sie einen der Anschlüsse entfernen, notieren Sie sich vorsichtshalber die genaue Ausrichtung, damit der spätere Zusammenbau leichter fällt. Einzelheiten zur Demontage finden Sie in Abbildung 7.2 und der Darstellung in aufgelösten Einzelteilen in Kapitel 11.

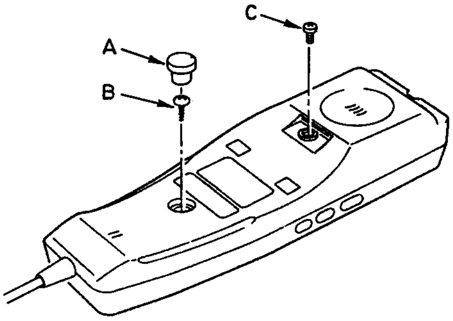


Abbildung 7.2 Demontage der Telefonhörereinheit

(1) Vergewissern Sie sich, daß die SIM-Karte aus dem Hörer entfernt wurde; sie wird ausgeworfen, wenn der Knopf am Hörer hochgedrückt wird.

(2) Legen Sie den Hörer mit der Tastenfeldseite nach unten hin und achten Sie darauf, daß die Anzeige nicht zerkratzt wird.

(3) Den Gummistöpsel (A) abziehen und die Schraube (B) dahinter entfernen. Schraube (C) ebenfalls entfernen, um das Gehäuse abnehmen zu können.

(4) Legen Sie jetzt den Telefonhörer mit der Tastenfeldseite nach oben auf eine Unterlage. Drücken Sie mit dem Handballen leicht auf das Tastenfeld und trennen die Gehäuseschalen indem Sie die obere Schale am Kartenleserende anheben. Nachdem Sie die Gehäuse teile entfernt haben, kommen das Ohrteil, die SIM-Kartenschnittstelle, die Hörerflachbaugruppe und die Mikrofon- und Lautsprecherbaugruppen zum Vorschein.

(5) Lösen Sie die Halterung der SIM-Kartenschnittstelle und merken Sie sich ihre Ausrichtung für den späteren Zusammenbau (gekrümmte Seite nach oben).

(6) Halten Sie die SIM-Kartenschnittstelle und nehmen Sie dabei die Flachbaugruppe aus der unteren Gehäusehälfte heraus.

Achtung

Die LCD-Anzeige ist nun nicht mehr gegen Kratzer usw. geschützt. Achten Sie besonders darauf, daß die LCD-Anzeige nicht beschädigt wird.

(7) Legen Sie die Hörerflachbaugruppe/SIM-Schnittstellenseite nach unten zeigend auf eine geeignete Unterlage.

(8) Entfernen Sie die SIM-Schnittstelle durch Lösen der vier integrierten Metallklammern, die die Schnittstelle mit der Flachbaugruppe verbinden und ziehen Sie dann den kleinen Gleichstromanschluß J804 ab.

(9) Entfernen Sie das Steuer- und Daten-Flachbandkabel, indem Sie das obere Ende des Anschlusses nach vorne drücken. (Siehe Abbildung 7.3)

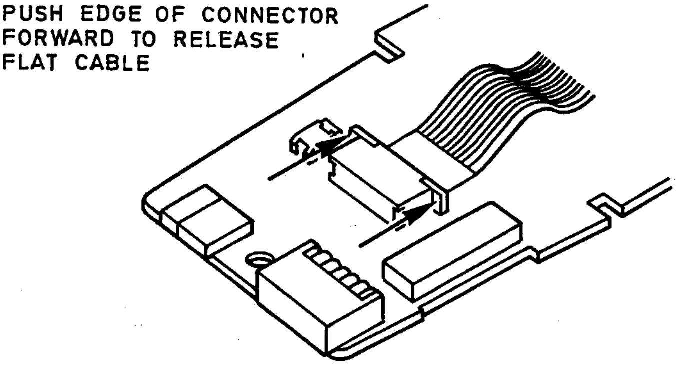


Abbildung 7.3 Entfernung des Steuer- und Daten-Flachbandkabels

(10) Lösen Sie die Lautstärke/Abschalt-Taste plus Membrane von ihrer Halterung an der Hörerflachbaugruppe, indem Sie die beiden kleinen Schrauben und die Klammer entfernen.

(11) Lösen Sie die Tastenfeldbaugruppe und drehen sie so, daß beide Baugruppen Seite an Seite liegen. Halten Sie das Verbindungskabel zwischen Daumen und Zeigefinger fest und ziehen Sie es mit einem angemessenen Zug aus dem Anschluß heraus.

(12) Entfernen Sie die Anschlüsse J801, J802 und J803, die sich am unteren Ende der Hörerflachbaugruppe befinden. Lösen Sie die Lautsprecher/Mikrofon-Baugruppe aus der Hörerflachbaugruppe.

(13) Die LCD-Anzeige wird von vier Metallstiften gehalten, die durch Löcher in der Flachbaugruppe hindurchgehen. Um die LCD-Anzeige herauszunehmen, biegen Sie die Stifte einfach gerade, sodaß sie durch die Öffnungen hindurchgehen. Der Deckring wird nun freigegeben und die LCD-Baugruppe kann herausgenommen werden. Die LCD-Baugruppe besteht aus folgenden Komponenten:

(a) Flüssigkristallanzeige.

(b) Hintergrundbeleuchtung.

(c) Leitungsstreifen mit zwei Anschlüssen.

(d) Plastikeinsatz.

(e) Deckring.

7.5 TRAGSCHALE

Folgende Demontageanweisungen ermöglichen den Zugang zu der Flachbaugruppe mit der Akku-Ladeeinrichtung der tragbaren Gehäuseeinheit. Wenn eine Baugruppe ausgebaut werden soll, die hier nicht erwähnt wird, ziehen Sie die Darstellung in aufgelösten Einzelteilen in Kapitel 11 zu Rate. Die folgende Anleitung geht von einem vollständigen Gerät aus, d.h. mit Telefonhörer und Batterie (Akku).

(1) Stellen Sie das Gerät auf eine glatte Unterlage, und zwar mit dem Tragegriff von Ihnen wegzeigend. Nehmen Sie den Telefonhörer ab und lösen Sie das Spiralkabel von der Sender/Empfänger-Einheit durch Drücken auf die am Anschluß selbst angebrachten Klemme.

(2) Sie können den Akku herausnehmen, wenn Sie die Halterung auf der linken Seite des Gehäuses der tragbaren Einheit lösen. Der Akku springt etwas hervor und kann nun herausgenommen werden.

(3) Um die Tragschale von der Sender/Empfänger-Einheit zu trennen, die in der Mitte der Telefonhörervertiefung befindliche, lange, unverlierbare Schraube lösen. Klappen Sie nun das Gehäuse hoch und lösen Sie es von der Sender/Empfänger-Einheit, indem Sie am Tragegriff anfassen und hochziehen.

(4) Legen Sie die Tragschale auf eine glatte Unterlage, und zwar mit dem Tragegriff von Ihnen wegzeigend und der Unterseite nach oben. (Siehe Abbildung 7.4)

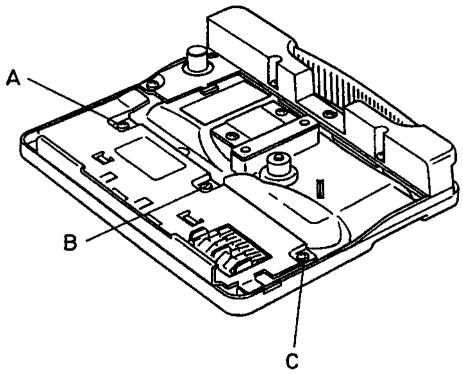


Abbildung 7.4 Demontage der Tragschale

(5) Entfernen Sie die drei Schrauben (A, B und C) und schieben Sie dann die Abdeckplatte nach vorne, damit die fünf Halterungslöcher zum Vorschein kommen und nehmen die Platte ab, um die für die Akku-Aufladung zuständige Flachbaugruppe freizulegen.

(6) Lösen Sie die beiden Schrauben, mit denen die Flachbaugruppe am Gehäuse festgehalten wird. Heben Sie den rechten Anschluß hoch, um die Kabel von den Klemmen zu befreien und heben Sie die Flachbaugruppe für Akku-Aufladung aus dem Gehäuse heraus.

(7) Stemmen Sie sorgfältig die Abdeckung weg, die die Flachbaugruppe umgibt. Diese Abdeckung greift an drei Punkten ineinander.

7.6 SENDER/EMPFÄNGER-EINHEIT

Die folgende Anleitung beschreibt, wie man die Sender/Empfänger-Einheit öffnet und wie man die dazugehörige Sender/Empfänger-Flachbaugruppe ausbaut. Einzelheiten finden Sie in Abbildung 7.5 und der Darstellung in aufgelösten Einzelteilen in Kapitel 11.

Hinweis: Bevor Sie versuchen, die Sender/Empfänger-Einheit zu demontieren, muß sie zuerst aus ihrer Betriebsumgebung entfernt werden, d.h. wenn das Mobiltelefon eine tragbare Einheit ist, muß das Gehäuse der tragbaren Einheit abgenommen werden; wenn das Mobiltelefon in einem Auto eingebaut ist, so muß es von der Einbauvorrichtung entfernt werden.

(1) Stellen Sie die Sender/Empfänger-Einheit auf eine glatte, antistatische Unterlage, wobei der Batterieanschluß nach oben zeigen muß.

(2) Lösen Sie die in Abbildung 7.5 gezeigten fünf Schrauben (1 to 5) und nehmen Sie die Abdeckung ab, um an die Sender/Empfänger-Platine zu gelangen.

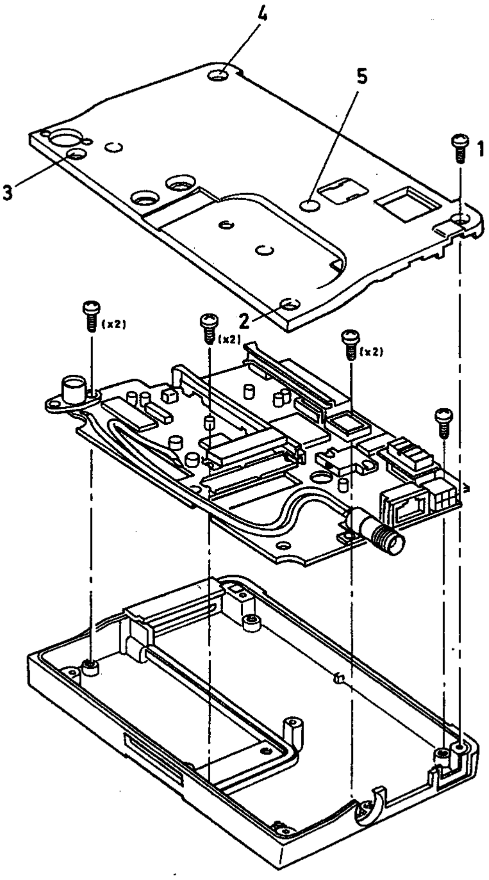


Figure 7.5 Demontage der Sender/Empfänger-Einheit

(3) Lösen Sie die Schrauben an jedem der RF-Anschlüsse, danach die vier verbleibenden Schrauben, die um die Platine herum angeordnet sind.

(4) Lösen Sie die zwei Schrauben, die das Stromverstärkermodul sichern und heben Sie die Sender/Empfänger-Platine aus dem Gehäuse heraus.

8. ANLEITUNG ZUR FEHLERBEHEBUNG

8.1 EINFÜHRUNG

Dieses Kapitel enthält Anweisungen, um die Fehlersuche und -behebung Schritt für Schritt durchführen zu können, die als Hilfe bei der Isolierung und Identifizierung von Fehlern im GSM Mobiltelefonsystem zu verstehen ist. Die Anleitung ist in Form von mehreren Fehlerdiagnosetabellen aufgebaut, wobei jede einzelne aus einer Liste von möglichen Fehlern und den empfohlenen Verfahren zur Identifizierung der Fehlfunktion besteht. Fehlerdiagnosetabellen wurden für die Hauptsystemkomponenten, wie nachfolgend aufgeführt, erstellt:

(1) Tabelle 8.1 - Telefonhörereinheit.

(2) Tabelle 8.2 - Hörerauflage mit eingebauter Freisprecheinrichtung.

(3) Tabelle 8.3 - Tragschale.

Falls ein Fehler unter Zuhilfenahme der zutreffenden Fehlerdiagnosetabelle nicht lokalisiert werden kann, sehen Sie sich das Schaltkreisdiagramm und die dazugehörige technische Beschreibung für die entsprechende Einheit an, und wenden Sie dann die konventionellen Fehlersuchverfahren an, um die defekte Untergruppe oder Komponente ausfindig zu machen.

Hinweis: Um die in diesem Kapitel gezeigten Diagnoseverfahren durchführen zu können, ist die Demontage einiger Teile der Ausrüstung unumgänglich. Für weitere Demontageanweisungen bitte unter Kapitel 7 nachschlagen.

8.2 TELEFONHÖREREINHEIT

Fehlerdiagnoseverfahren für die Telefonhörereinheit sind in der unten aufgeführten Tabelle 8.1 enthalten.

Tabelle 8.1 Fehlerdiagnoseanleitung für die Telefonhörereinheit

FEHLER	DIAGNOSEVERFAHREN
Der gesamte Telefonhörer funktioniert nicht.	1. 13 V Stromversorgung überprüfen (P702 pin 2). 2. V5D Spannungsschiene überprüfen. (Spannungsregler Q705 & dazugehörige Komponenten).
Telefonhörereinheit wird heiß. (Die Einheit bezieht zuviel Strom).	1. Auf Kurzschlüsse untersuchen. Speziell die Komponenten überprüfen, die an die, V5 SIM-Spannungsschiene angeschlossen sind oder mit ihr in Verbindung stehen.
1. LCD - keine Anzeige.	1. Logikstufe der CPU überprüfen, U701 pin 45. 2. Spannungsversorgung aus Q714 überprüfen.
2. LCD - Pixel funktionieren nicht korrekt.	1. Die Gummikontakte der LCD-Anzeige auf Staub und Schmutz untersuchen. 2. Die Ausgänge der entsprechenden Kontroll-Chips überprüfen, d.h. U709, U710 und U711. 3. Die entsprechenden COM- und SEG-Leitungen auf Unterbrechungen hin untersuchen. 4. Überprüfen, daß die LCD-Anzeige sich in korrekter Position auf dem 'Zebra'-Streifen befindet.
Lautstärkeregler defekt - nur einige oder alle Lautstärkestufen defekt.	1. Logische Ausgänge VOL 0, VOL 1 und VOL 2 der CPU überprüfen, U701. 2. Rund um Q713, Q703 und U203 herum auf Fehler untersuchen.

Tabelle 8.1 Fehlerdiagnoseanleitung für die Telefonhörereinheit (Fortsetzung)

FEHLER	DIAGNOSEVERFAHREN
1. Rote & grüne Leuchten funktionieren nicht.	1. V5D Stromschienen überprüfen. 2. CPU pin 39 auf korrekte logische Stufe hin untersuchen. 3. Spannungsstufen an Q722 überprüfen.
2. Nur rote ODER grüne Leuchte funktioniert.	1. CPU pin 61 auf korrekte logische Stufenwechsel hin untersuchen. 2. DC-Stufen der Schalttransistoren Q720, Q712, Q718, Q721, Q719 und Q701 überprüfen. 3. Spannungsstufen und die Steckverbindungen A und B zwischen den Leuchten und der Telefonhörer-Flachbaugruppe überprüfen.
1. Tastenfeld aktiviert CPU-Daten auf KEINEM der Knöpfe.	1. Abgleich zwischen den Kontakten der Telefonhörer-Flachbaugruppe und dem Lautstärkeregler-Kontaktstreifen überprüfen. 2. Anschluß des Tastenfeldes/Leuchten-Kontaktstreifen zu der Steckverbindung an der Telefonhörer-Flachbaugruppe untersuchen. 3. V5D-Spannungsschiene überprüfen.
2. Nicht alle, aber einige, Knöpfe aktivieren Daten der CPU.	1. DC-Stufen der entsprechenden Leitungen überprüfen. 2. Die entsprechenden Leitungen auf offene Schaltkreise hin untersuchen.
Ungewollte Geräusche kommen aus dem Lautsprecher.	1. Audio-Empfangsweg auf defekte Verbindungen untersuchen. 2. Stromversorgungsschienen auf Geräusche untersuchen.

8.3 FREISPRECH-GABELEINHEIT

In der anschließenden Tabelle 8.2 sind die Diagnoseverfahren für die Freisprecheinheit aufgelistet. Informationen zum korrekten Funktionieren bestimmter Bereiche dieser Einheit werden zusätzlich in den Abschnitten 8.3.1 bis 8.3.3 als Unterstützung zur Fehlerdiagnose angeboten.

8.3.1 HAUPTBEREICHE DER EINHEIT

(1) Rx AUDIO-Weg: Mit einem 1 kHz @ - 13 dBV Eingang prüfen und auf ein 1 kHz @ - 17 dBV Ausgang (VR auf Min.) untersuchen.

(2) Tx AUDIO-Weg: Mit einem 1 kHz @ - 53 dB Eingang prüfen und auf ein 1 kHz @ - 9 dBV ± 1 dB Ausgang untersuchen.

(3) Chopper-Schaltkreis, (DTMF): Überprüfen, ob das Rx-Signal einer DC-Stufe angeglichen wurde, um die Impulsbreiten der Tx/Rx ABSCHALT-Impulse zu steuern.

(4) Stromversorgung: +13.5 V CU Strom.
+ 5 V Logischer Strom.
+ 4 und 5 V, abgezweigt von 13.5 V.

(5) Freisprecher EIN/AUS CCT: am Anschluß J804, HF EIN = 0 V, HF AUS = 3.8 V (ca.).

8.3.2 IMPULSSTEUERUNG IM CHOPPER-SCHALTKREIS

(Wechselnde DC-Referenz, vom Rx AUDIO-Signal abgeleitet, um einer Rückkoppelung (Schaltkreisrückheulen) vorzubeugen.)

(1) Niedrige Rx Lautstärkestufe oder niedrige Frequenz I/P auf der Rx Leitung:
Verstärkt die Tx Impulsbreite an U806 pin 7.
Schwächt die Rx Impulsbreite an U806 pin 1 ab.

(2) Hohe Rx Lautstärkestufe (R842) oder hohe Frequenz I/P auf der Rx Leitung:
Schwächt die Tx Impulsbreite an U806 pin 7 ab.
Verstärkt die Rx Impulsbreite an U806 pin 1.
(Hoher Impuls schaltet die Tx und Rx Leitungen an U803 beziehungsweise an U812 ab).

8.3.3 Rx GLEICHRICHTUNGSSTUFE

(Unterbrechen des Tx/Rx-Signals) DTMF gemessen an Tx AUDIO O/P (mit 1 kHz an Rx I/P).

(1) DTMF HOCH - 1 kHz bei ca. -7 dB gemessen.
(2) DTMF OK - 1 kHz bei ca. -23 dB gemessen.

(3) DTMF NIEDRIG - 1 kHz bei ca. -30 dB und darunter gemessen.

Tabelle 8.2 Fehlerdiagnoseverfahren für die Freisprech-Gabeleinheit

Tx	DTMF	Rx	DIAGNOSEVERFAHREN
OK	OK	NIEDRIG	DTMF OK Rx nach U812 hauptsächlich am Audioverstärker, U805 überprüfen. Widerstände zwischen Signalleitung und Signalerdung überprüfen. Chopper O/P an U806 pin 1 (kein O/P, d.h. 0 V, wird die Rx Leitung an U812 abschalten) überprüfen.
OK	HOCH	NIEDRIG	Start des Rx-Weges bis U812 überprüfen. DTMF hoch da kein REF DC für den Chopper-Schaltkreis von der Rx-Leitung vorhanden. 8 V/4 V-Versorgung der Rx-Leitung überprüfen. Impulsbreiten an U806 pins 1 und 7 (DTMF hoch gemessen an Tx O/P, OK = 23 dBV.) überprüfen.
OK	NIED-RIG	HOCH	REF DC zum Chopper-Schaltkreis überprüfen. Wenn ca. 4.5 V an U806 pin 6 (sollte um +1.9 V liegen), den Gleichrichterschaltkreis untersuchen (D802 usw.). Tx/Rx- Schaltimpulse werden umgekehrt.
NIED-RIG	NIED-RIG	NIEDRIG	+13.5 V, 5 V Leitungen und +4 V Versorgungsleitungen überprüfen. Zeitgeberschaltkreis überprüfen - kein O/P an U806 verursacht niedrige Werte auf den Tx/Rx- Abschaltleitungen, Rx/Tx-Schaltkreise abgeschaltet. Widerstand zwischen Signalleitung und Signalerdung, Tx und Rx überprüfen.
NIED-RIG	NIED-RIG	OK	Überprüfen, ob U803 abgeschaltet wurde (0V) aufgrund des Tx Chopper-Schaltkreises mit falscher O/P an U806 pin 7. DTMF niedrig da auf dem Tx O/P-Pfad gemessen. Widerstand zwischen Signalleitung und Signalerdung von Tx.
NIED-RIG	HOCH	WIRD NICHT auf die niedrigste angeforderte Stufe heruntergehen.	Gleichgerichtetes Rx-Signal überprüfen, um die Chopper-Impulsbreite zu ändern, d.h. kein REF DC-Signal vorhanden.

8.4 TRAGSCHALE

Die Fehlerdiagnoseverfahren für die Tragschale sind in Tabelle 8.3 aufgeführt.

Tabelle 8.3 Fehlerdiagnoseanleitung für die Akkuladeschaltung

FEHLER	DIAGNOSEVERFAHREN
Akku wird nicht geladen.	(1) 12 V an J501 pin 3 überprüfen. (2) 12 V an U501 pin 3 überprüfen. (3) 5 V an U502 pin 16 überprüfen. (4) 0V an U502 pin 3 überprüfen. (5) 12 V an U505 pins 5, 11 und 12 überprüfen. (6) U503 pins 5, 9 und 10 auf Rechteckschwingungen hin (bei ca. 80 kHz) untersuchen. (7) Überprüfen, daß Q504 und Q503 auf Ein/Aus schalten. (8) 18 V an J502 pin 1 überprüfen.

9. REPAIR

9.1 INTRODUCTION

This chapter details the repair philisophy for the GSM Mobile Telephone system.

9.2 REPAIR PHILOSOPHY

The repair philosophy requires 'component level replacement' for all system units, except the Transceiver Unit which is defined as 'board level replacement'.

Therefore all components of the Handset, Handsfree Cradle, and Transportable Case Unit are replaceable, however repair of the Transceiver Unit is limited to replacing the transceiver pcb: the pcb must be returned to the manufacturer for repair.

9.3 REPAIR PROCEDURE

Most repairs will involve the routine replacement of damaged or faulty components. Information given in Chapter 8 (Troubleshooting Guide) will assist in isolating and identifying faulty components. Faulty components should be replaced using the disassembly and reassembly procedures provided in Chapters 7 and 10, respectively.

Should a unit be beyond economic repair, service assemblies are available (see table 9.1 below). In the case of a faulty transceiver a service assembly is provided for replacement as defined in paragraph 9.2.

Table 9.1 Service Assemblies

DESCRIPTION	PART No.
Transceiver Assembly	MCSA - 2803GB01
Handset Assembly	MCSA - 1142GB01
Handsfree Assembly	MCSA - 3467GB01
Transportable Assembly	MCSA - 3468GB01

Subsequent to repair, the unit should be re-installed into the system (ref. Chapter 4), and then tested to verify serviceability: test command details are provided in Chapter 6; a transceiver test procedure is provided in Chapter 10.

10. MONTAGEANLEITUNG

10.1 EINFÜHRUNG

Dieses Kapitel enthält Montageanweisungen für die wichtigsten Komponenten des GSM Mobiltelefonsystems, wie nachfolgend aufgeführt:

(1) Sender/Empfänger-Einheit (einschließlich Prüfverfahren).

(2) Tragschale.

(3) Telefonhörereinheit.

(4) Freisprecheinheit.

WARNUNG

Die in diesem Handbuch beschriebene Ausrüstung enthält polarisierte Kondensatoren, die flüssiges Electrolyt verwenden. Diese Teile sind vollkommen sicher, vorausgesetzt, es kommt weder zu einem Kurzschluß noch zu einem Anschluß mit entgegengesetzter Polarität an einem der Kondensatoranschlüsse. NICHTBEACHTUNG DIESER WARNUNG KÖNNTE ZU SCHÄDEN AN DER AUSRÜSTUNG FÜHREN ODER, SCHLIMMSTENFALLS, PERSONEN DURCH EINEN ELEKTROSCHOCK ODER DURCH EXPLOSION EINES BESCHÄDIGTEN KONDENSATORS VERLETZEN, WENN MIT DIESEN GERÄTEN UMGEGANGEN WIRD, IST ÄUSSERSTE VORSICHT NÖTIG.

Vorsichtsmaßnahmen

1. Die Sender/Empfänger-Einheit, die Telefonhörer- und Freisprech-Gabeleinheit enthalten Vorrichtungen (ESDs), die durch eine elektrostatische Entladung - ausgelöst durch fehlerhafte Handhabung - beschädigt werden können. Jedesmal wenn die einzelnen Einheiten auseinandergebaut werden, müssen die antistatischen Vorsichtsmaßnahmen eingehalten werden. Beachten Sie die anschließend aufgeführten ESD-Handhabungsvorkehrungen.

2. Beim Zusammenbau der Einheiten muß darauf geachtet werden, daß die Schrauben nicht zu stark angezogen werden. Es muß besonders vorsichtig vorgegangen werden, wenn andere Schneidschrauben verwendet werden (sie werden in der Telefonhörereinheit, in der Freisprech-Gabeleinheit und im Tragbare Gehäuseeinheit verwendet), da diese Schrauben in Plastikvertiefungen hineingeschraubt werden.

10.2 VORSICHTSMASSNAHMEN FÜR DEN UMGANG MIT ESD

Bevor mit dem Zerlegen begonnen wird, müssen folgende antistatische Vorsichtsmaßnahmen eingehalten werden, um eventuellen Schäden vorzubeugen.

10.2.1 SPEZIELLER ARBEITSBEREICH (SAB)

Es muß ein Arbeitsbereich vorhanden sein, an dem elektrostatisch empfindliche Geräte sicher gehandhabt werden können, d.h. ohne Risiko einer Beschädigung aufgrund von elektrostatischen Entladungen. Der Bereich muß folgendermaßen ausgestattet sein:

(1) Arbeitsflächen - Alle Arbeitsflächen müssen mit einer ladungsableitenden Arbeitsmatte ausgerüstet sein - SICHER FÜR DAS ARBEITEN MIT AUSRÜSTUNG, DIE UNTER SPANNUNG STEHT - die über einen 1 MΩ Widerstand (normalerweise in die Leitung zwischengeschaltet) an eine Erdungsleitung angeschlossen ist.

(2) Armband - Es handelt sich hierbei um ein schnell an- und abzulegendes Armband mit direktem Hautkontakt, der über eine bewegliche Schnur mit einem Sicherheitswiderstand zwischen 5 kΩ und 1 MΩ an eine ladungsabführende Erdungsleitung angeschlossen und unbedingt verwendet werden sollte.

(3) Behälter - Alle Behälter und Förderungseinrichtungen müssen leitend sein.

10.2.2SAB-ÜBERPRÜFUNG

Es ist die Aufgabe eines jeden Wartungstechnikers, die Armbänder und die Schnur einmal wöchentlich auf ihre Funktionsfähigkeit hin zu überprüfen.

10.3 SENDER/EMPFÄNGER-EINHEIT

Folgende Anleitung beschreibt, wie die Sender/Empfänger-Flachbaugruppe wieder einzusetzen ist und wie das Gehäuse wieder montiert wird. Weitere Einzelheiten finden Sie in Abbildung 10.1 und der Darstellung in aufgelösten Einzelteilen in Kapitel 11.

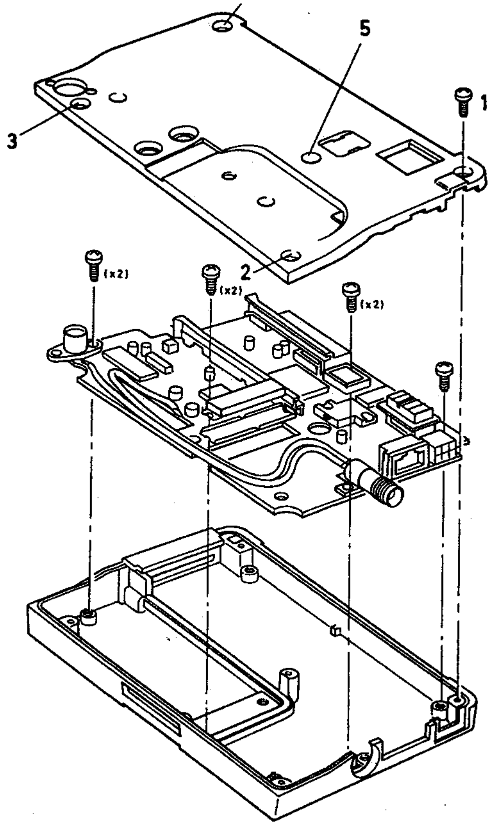


Abbildung 10.1 Zusammenbau der Sender/Empfänger-Einheit

(1) Überprüfen Sie den Zustand aller Dichtungen: Beschädigte Dichtungen sollten gegebenenfalls ausgewechselt werden.

(2) Stellen Sie die Sender/Empfänger-Einheit auf eine glatte, antistatische Unterlage.

(3) Setzen Sie die Sender/Empfänger-Flachbaugruppe in die vorgesehene Position an der Basis des Gehäuses und sichern dann das Stromverstärkungsmodul mit zwei Schrauben mit Unterlegscheiben.

(4) Sichern Sie die Sender/Empfänger-Flachbaugruppe an der Basis des Gehäuses mit den vier Schrauben, die rund um die Flachbaugruppe angeordnet sind und mit den zwei Schrauben, die durch der beiden RF-Anschlüsse hindurchgesteckt werden müssen.

(5) Achten Sie beim Wiedereinsetzen der Abdeckung darauf, daß die beiden RF-Leitungen so liegen, daß sie sich nicht verheddern oder eingeklemmt werden.

(6) Sichern Sie die Abdeckung der Einheit mit fünf Schrauben (1 to 5).

(7) Für Einzelheiten zum Wiedereinbau der Sender/Empfänger-Einheit unter Kapitel 4 nachschlagen.

10.4 SENDER/EMPFÄNGER-EINHEIT - PRÜFVERFAHREN

Folgendes Prüfverfahren sollte durchgeführt werden nachdem die Sender/Empfänger-Flachbaugruppe wieder komplett eingebaut wurde (Gehäuseoberteil ebenfalls montiert).

Um die Prüfungen durchführen zu können, ist folgende Ausrüstung erforderlich:

Tabelle 10.1 Prüfausrüstung

KOMPONENTE	AUSRÜSTUNG
1	Telefonhörer, passwortgeschütztes Prüfkabel MCST-0001GB01, variable Stromversorgung mit Strom- und Spannungsbegrenzung plus Meßwerte
2	Antenne
3	Gültige SIM-Karte

Gehen Sie folgendermaßen vor:

(1) Stellen Sie die Sender/Empfänger-Einheit auf eine geeignete Unterlage und schließen Sie den Telefonhörer, die Antenne und das passwortgeschützte Prüfkabel an.

(2) Stellen Sie die Stromversorgung auf 13.2 V und die Strombegrenzung auf 800 mA ein.

(3) Schalten Sie die Stromversorgung ein und achten Sie darauf, daß das Relais in der Sender/Empfänger-Einheit umschaltet (zweimaliges Klicken). Überprüfen Sie, daß der bezogene Strom sich zwischen 10 und 30 mA bewegt.

(4) Drücken Sie auf den Telefonhörer ⏻ Knopf und prüfen Sie, daß der bezogene Strom auf Werte angestiegen ist, die zwischen 250 und 450 mA liegen.

(5) Beim Einschalten sollte die Telefonhöreranzeige auf ihre Funktionsfähigkeit hin beobachtet werden. Legen Sie die SIM-Karte ein, geben Sie die PIN-Nummer ein und überprüfen Sie dann jede einzelne Taste des Tastenfeldes auf korrekte Ausführung des entsprechenden Vorgangs.

(6) Überprüfen Sie ebenfalls die Funktionsfähigkeit der beiden Lautstärketasten, die sich seitlich an dem Telefonhörer befinden.

(7) Geben Sie den Prüfmodus durch Betätigen der F + ein.

(8) Um den Audioweg zu prüfen, die analoge Endlosschleife durch Eingabe des Befehls auswählen 4 2 ☎ 1 ☎. Sprechen Sie in den Hörer und prüfen Sie, ob klare Audiosignale aus dem Lautsprecher der Ohrmuschel (Eigenecho) zu hören sind.

(9) Geben Sie den Prüfbefehl 4 2 ☎ 5 ☎ ein, um die Sprachcodeumsetzer- und die Sprachdecodierer-Endlosschleife auszuwählen. Sprechen Sie noch einmal in den Hörer, überprüfen Sie dieses Mal, ob die Sprache deutlich anders klingt, und zwar in hoher Tonlage und mit einem Echo: Dieser Effekt ergibt sich aus der digitalen Abtastung (Sampling) und Codeumsetzung.

(10) Verlassen Sie den Prüfmodus durch Eingabe von ☎ . Drehen Sie die Stromversorgung der Mobileinheit des Hörers herunter und schalten Sie dann erst die Stromzufuhr ab.

(11) Um die Mobileinheit weiter zu prüfen, die Strombegrenzung (Stromversorgung) auf 2 Ampere erhöhen und den Strom für die Mobileinheit einschalten.

(12) Betätigen Sie die ⏻ Taste des Telefonhörers, legen Sie eine gültige SIM-Karte ein und geben Sie den PIN-Code ein. Wählen Sie eine entsprechende Test-Nummer und bei erfolgreichem Anruf, beenden Sie den Anruf ordnungsgemäß durch Betätigung der ☎ . Dieser Test überprüft die korrekte Signalübertragung zwischen der Mobileinheit und der Basisstation des Systems.

Falls die Sender/Empfänger-Einheit einen der oben genannten Tests nur teilweise oder gar nicht besteht, ist die Einheit für den Normalgebrauch nicht einsatzfähig. Gesetzt den Fall, daß eine neu eingesetzte Sender/Empfänger-Flachbaugruppe versagt, muß diese wieder ausgetauscht werden und die gesamte Einheit muß neu geprüft werden.

10.5 TRAGSCHALE

Folgende Anleitung beschreibt, wie die Baugruppe mit der Akku-Ladeschaltung instandzusetzen ist und wie das Gehäuse wieder zusammengebaut wird. Wenn eine Baugruppe eingebaut werden soll, die hier keine Erwähnung findet, ziehen Sie die Darstellung in aufgelösten Einzelteilen in Kapitel 11 zu Rate.

(1) Plazieren Sie die Abdeckung wieder um die Flachbaugruppe mit dem Akku-Ladegerät: Es gibt drei Stellen, an denen diese Abdeckung ineinandergreift.

(2) Legen Sie die Tragschale auf eine glatte Unterlage, und zwar mit dem Tragegriff von Ihnen wegzeigend und der Unterseite nach oben. (Siehe Abbildung 10.2)

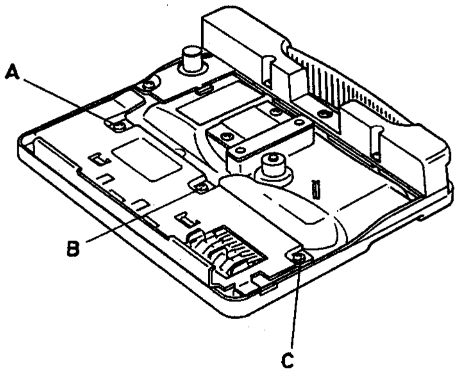


Figure 10.2 Zusammenbau der Tragschale

(3) Setzen Sie die Flachbaugruppe mit der Akku-Ladeschaltung wieder in das Gehäuse und lockern Sie den rechten Anschluß, um die Kabel in den entsprechenden Kabelklemmen zu sichern.

(4) Sichern Sie die Flachbaugruppe im Gehäuse mit Hilfe der beiden Halterungsschrauben.

(5) Setzen Sie die Abdeckplatte über die Flachbaugruppe und schieben Sie diese rückwärts in die fünf Halterungsöffnungen.

(6) Sichern Sie die Abdeckplatte mit drei Schrauben (A, B und C).

(7) Für Einzelheiten über das Einbauen der Sender/Empfänger-Einheit, des Telefonhörers und des Akkus in die tragbare Gehäuseeinheit bitte unter Kapitel 4 nachschlagen.

10.6 TELEFONHÖREREINHEIT

Folgende Anleitung beschreibt, wie die internen Komponenten der Telefonhörereinheit eingebaut werden und wie das Gehäuse wieder montiert wird. Einzelheiten finden Sie in Abbildungen 10.3 und 10.4 und der Darstellung in aufgelösten Einzelteilen in Kapitel 11.

Vorsicht

Wenn die LCD-Baugruppe nicht in die Hörerflachbaugruppe eingesetzt und die Flachbaugruppe nicht in das Hörergehäuse eingebaut wurde, ist die LCD-Anzeige ohne jeglichen Schutz. Es sollte hierbei besonders darauf geachtet werden, daß die LCD-Anzeige nicht beschädigt wird.

(1) Die LCD-Baugruppe wird an der Hörerflachbaugruppe von vier Metallstiften festgehalten, die durch entsprechende Löcher in der Flachbaugruppe hindurchgesteckt werden. Die LCD-Baugruppe besteht aus folgenden Komponenten:

(a) Flüssigkristallanzeige.

(b) Hintergrundbeleuchtung.

(c) Leitungsstreifen mit zwei Anschlüssen.

(d) Plastikeinsatz.

(e) Deckring.

Vorsicht

Beim Zusammenbau der LCD-Baugruppe darauf achten, daß die Polsterungen der Flachbaugruppe und der LCD-Anzeige als auch die Leitungsstreifen äußerst sauber und staubfrei sind. Die Berührung dieser Bereiche kann zum Ausfall der LCD-Anzeige führen.

(2) Fügen Sie die LCD-Baugruppe in die Hörerflachbaugruppe ein und biegen Sie die vier Metallstifte zur Sicherung der Baugruppe einmal um.

(3) Setzen Sie die Lautsprecher/Mikrofon-Baugruppe in die Hörerflachbaugruppe ein und klemmen Sie diese an der vorgesehenen Position ein. Schließen Sie die Anschlüsse J801, J802 und J803 am unteren Ende der Hörerflachbaugruppe an, so wie während des Demontagevorgangs notiert.

(4) Legen Sie die Lautstärke/Abschalt-Taste und Membranbaugruppe an die Seite der Tastenfeldbaugruppe. Stecken Sie das Verbindungskabel wieder in die entsprechende Anschlußbuchse, so wie während des Demontagevorgangs notiert.

(5) Drehen Sie die Tastenfeldbaugruppe so, daß sie wieder in die Hörerflachbaugruppe paßt und klemmen Sie sie dann in der richtigen Position wieder fest.

(6) Setzen Sie die Lautstärke/Abschalt-Taste und die Membranbaugruppe wieder seitlich der Hörerflachbaugruppe ein und sichern Sie diese mit Hilfe der Klammer und der beiden Schrauben.

(7) Setzen Sie das Steuer- und Daten-Flachbandkabel wieder ein, indem Sie das obere Ende des dazugehörigen Anschlusses nach vorne drücken und das Kabel hineinstecken. (Siehe Abbildung 10.3 unten)

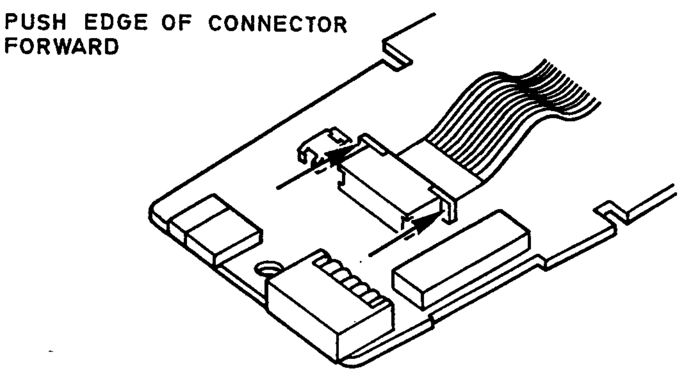


Abbildung 10.3 Einsetzen des Steuer- und Daten-Flachbandkabels

(8) Legen Sie die Hörerflachbaugruppe mit der oberen Seite nach unten auf eine geeignete Unterlage.

(9) Setzen Sie den Kartenleser wieder ein und verwenden Sie dabei die vier integrierten Metallklemmen, um sie an der Hörerflachbaugruppe festzumachen.

(10) Setzen Sie den kleinen DC-Versorgungsanschluß P4 (einfach hineinstecken) wieder ein.

(11) Halten Sie den Kartenleser und setzen die gesamte Flachbaugruppeneinheit exakt in das untere Gehäuseteil ein, und zwar so, daß die Durchführungsdichtung des Hörerkabels genau in der dafür vorgesehenen Gehäuseöffnung sitzt.

(12) Befestigen Sie mit dem Metallbügel den Kartenleser und sichern Sie dabei die gesamte Flachbaugruppeneinheit im unteren Gehäuseteil. Der Metallbügel wird auf beiden Seiten von Klammern festgehalten und die gebogene Seite befindet sich an oberster Stelle.

(13) Das Gehäuseunterteil des Hörers mit dem Tastenfeld zeigt immer noch nach unten; plazieren Sie jetzt das Ohrteil des oberen Gehäuses in das untere Gehäuseteil (durch vier kleine "Nasen" gesichert), sodaß sie genau ineinanderpassen und klicken Sie sie dann zusammen. Achten Sie darauf, daß die Schutzstreifen (auf beiden Seiten der Hörerflachbaugruppe) sich beim Schließen auch innerhalb des Gehäuses befinden.

(14) Sichern Sie das Gehäuseoberteil mit dem Gehäuseunterteil mit Hilfe zweier Schrauben (B and C). (Siehe Abbildung 10.4 unten)

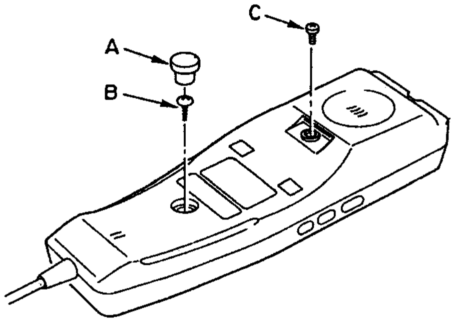


Figure 10.4 Zusammenbau der Telefonhörereinheit

(15) Setzen Sie den Gummistöpsel wieder ein (A); achten Sie auf die korrekte Ausrichtung: Der Gummistöpsel ist keilförmig und die kerbe sollte in Richtung Ohrteil zeigen.

10.7 FREISPRECHGABELEINHEIT

Folgende Anleitung beschreibt, wie die Gabelflachbaugruppe wieder eingesetzt wird und wie das dazugehörige Gehäuse wieder zusammengebaut wird. Weitere Einzelheiten finden Sie in Abbildung 10.5 und dem vergrößerten Übersichtsdiagramm in Kapitel 11.

(1) Setzen Sie die Gabelflachbaugruppe in die vorgesehene Position innerhalb des unteren Gehäuseteils, sodaß sie auf den drei Halteklemmen aufliegt, die sich neben den Anschlüssen J801, J802 und J803 befinden.

(2) Drücken Sie vorsichtig auf die Gabelflachbaugruppe bis diese zwischen den drei Klemmen einrastet.

(3) Verbinden Sie den Lautsprecheranschluß mit Buchse P802 der Flachbaugruppe.

(4) Setzen Sie die Abdeckung wieder in das untere Gehäuseteil, indem Sie die beiden "Nasen" der Abdeckung (neben dem Lautsprecher) in die gegenüberliegenden Löcher des Gehäuseunterteils einlassen und die beiden Hälften zusammendrücken.

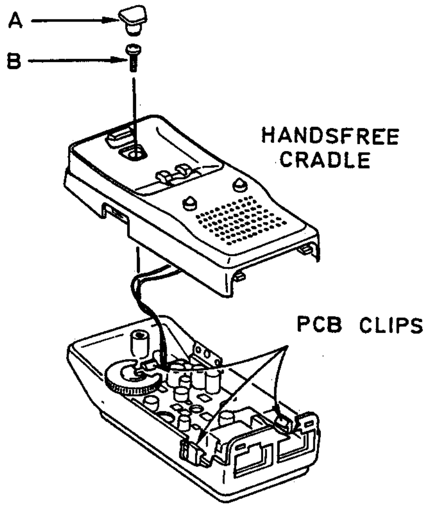


Abbildung 10.5 Zusammenbau der Freisprechgabeleinheit

(5) Sichern Sie die Abdeckung an dem Gehäuseunterteil mit Hilfe einer Schraube (B). Setzen Sie nun den Gummistöpsel wieder ein (A). Sie müssen dabei die korrekte Ausrichtung des Stöpsels beachten.

(6) Für weitere Einzelheiten zur Installation der Freisprechgabeleinheit bitte unter Kapitel 4 nachschlagen.

11. ILLUSTRATED PARTS LIST

11.1 INTRODUCTION

This chapter provides the following information:

(1) Guide to Using the Parts List.

(2) Illustrated Parts Lists - Main Assemblies.

(3) Detailed Parts Lists - Circuit Components.

The Illustrated Parts List and supporting diagrams (exploded views) are provided to assist in the identification of component parts, and the subsequent requisitioning of replacement parts and/or spares.

11.2 GUIDE TO USING THE PARTS LISTS

11.2.1 MAIN ASSEMBLIES

When a part number of an item is known, but the description is not, refer to the Part Number columns. Find the part number and read across the Parts Name column for the description. By using the relevant item number, the part can also be located on the associated exploded view diagram (Figures 11.1 to 11.5).

When the item is known by the description but not the part number, and its location on the main assembly is known, obtain the item number from the exploded view diagram and use this to identify the item's part number in the relevant parts list.

11.2.2 CIRCUIT COMPONENTS

Detailed parts lists are provided for the circuit components of each main assembly, except the Transceiver Unit: circuit components for this unit are detailed in the associated Technical Manual.

Components listed in the detailed parts lists are referenced by the component's circuit reference: refer to Chapter 3 for pcb component layout diagrams of the Handset, Handsfree Cradle and Transportable Case Units, (the pcb component layouts of the Transceiver Unit are provided in the associated Technical Manual).

11.3 TRANSCEIVER UNIT (EB-2803) - PARTS LIST

Refer to Figure 11.1 for exploded view of Transceiver Unit

Model No.	EB-2803		Name	Transceiver
Item No.	Parts Symbol	Part No.	Part Name	Qty.
1	M101	4B10003B	Transceiver Cover	1
2	M102	5N10047A	Ant Connector Cover	1
3	M103	7G10085A	Green Dot Label	1
4	M104	7AC5013A	Label	1
5	M105	7G10083A	Label	1
6	M106	5N10046A	SIM Cover	1
7	M107	7G10084A	Label	1
8	M108	5N10056A	T/P Connector Cover	1
9	M109	XSB3 + 8FXK	Screw	1
10	M110	XSB3 + 8FXK	Screw	1
11	M111	XSB3 + 8FXK	Screw	1
12	M112	XSB3 + 8FXK	Screw	1
13	M113	XSB3 + 8FXK	Screw	1
14	M114	5AD5020BF	Tube Proc L220	1
15	M115	5AD5020BE	Tube Proc L530	1
16	M116	XTB3 + 8FFZ	Screw	1
17	M117	XTB3 + 8FFZ	Screw	1
18	M118	XTB3 + 8FFZ	Screw	1
19	M119	5Y10037B	PCB Guide B	1
20	M120	5Y10036A	PCB Guide A	1
21	M121	XTB3 + 8FFZ	Screw	1
22	M122	XTB3 + 8FFZ	Screw	1
23	M123	XTB3 + 8FFZ	Screw	1
24	M124	XTB3 + 8FFZ	Screw	1
25	M125	XTB3 + 8FFZ	Screw	1
26	M126	1C10104A	Shield Cover	1
27	M127	XTB3 + 8FFZ	Screw	1
28	M128	XTB3 + 8FFZ	Screw	1
29	M129	5AD5020BD	Shield Tube L205	1
30	M130	5N10049A	D Sub Connector Cover	1
31	M131	XSB3 + 6FXK	Screw	1
32	M132	XSB3 + 6FXK	Screw	1
33	M133	1B10316B	Data Bracket	1
34	M134	4A10010B	TR Case	1
35	M135	5AF5094B	Leg	1
36	M136	5AF5094B	Leg	1
37	M137	7C10052A	Name Plate	1
38	M138	5AF5094B	Leg	1
39	M139	5AF5094B	Leg	1
40		MCSA - 2803	Transceiver Service Assembly	-
41		WC10221E	GSM Antenna Connector	1

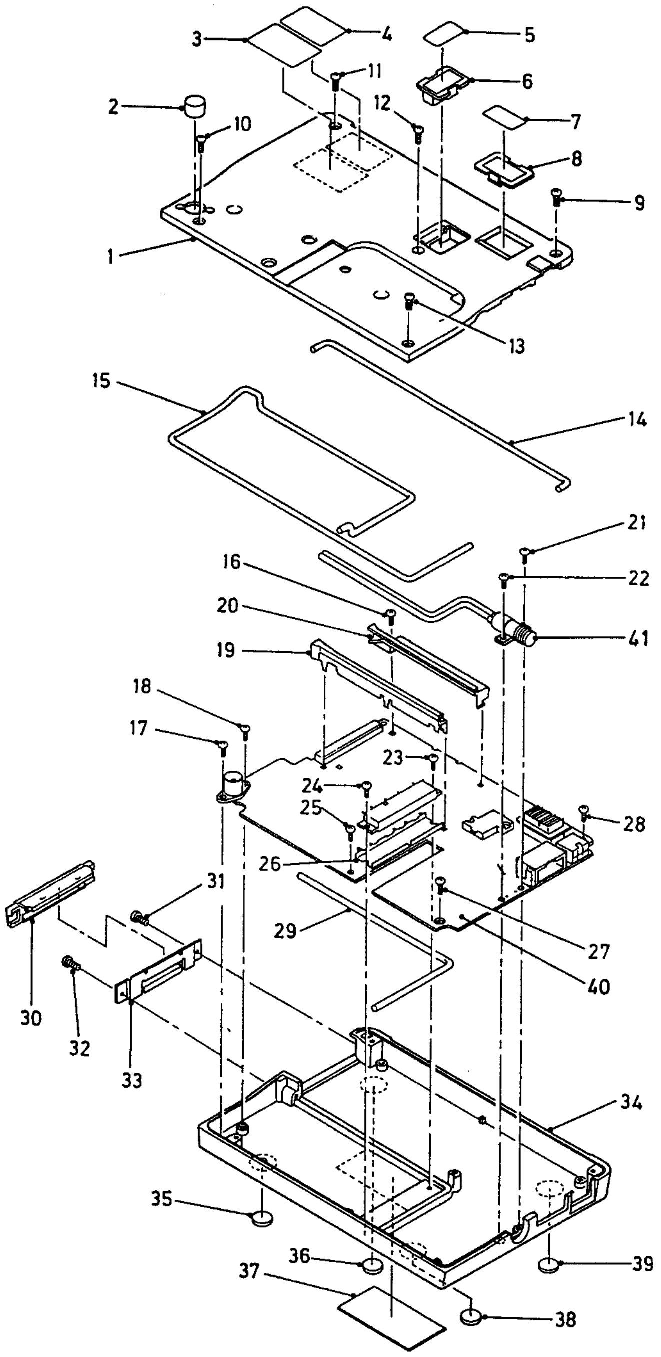

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Figure 11.1 Transceiver Unit (EB-2803) - Exploded View

11.4 HANDSET UNIT (EB-1142) - PARTS LIST

Refer to Figure 11.2 for exploded view of Handset Unit

Model No.	EB-1142	Name	Handset	
Item No.	Parts Symbol	Part No.	Part Name	Qty.
1	M201	5P10038A	LCD Panel	1
2	M202	6Z10035B	LCD Panel Sheet	1
3	M203	1K10095A	LCD Bracket	1
4	M204	5G10099A	LCD Sheet	1
5	M205	5K10038B	LCD Connector	1
6	M206	5K10038B	LCD Connector	1
7	M207	5N10051D	Handset Cover	1
8	M208	6V10010A	Speaker Net	1
9	M209	5Y10041B	Volume Button	1
10	M210	5EZ5597A	Connector Insulator	1
11	M211	5Y10040A	Key Button	1
12	M212	1B10318A	Volume Plate A	1
13	M213	5ZA5067A	Connector	1
14	M214	1B10319A	Volume Plate B	1
15	M215	XYN2 + C4FX	Screw	1
16	M216	XYN2 + C4FX	Screw	1
17	M217	6Z10037A	Volume Sheet	1
18	M218	5Y10039A	Receiver Holder	1
19	M219	5U10004A	Receiver Cushion	1
20	M220	6V10011A	Receiver Net	1
21	M221	XTB2 + 5GFX	Screw	1
22	M222	XTB2 + 5GFX	Screw	1
23	M223	6V10009A	SIM Sheet	1
24	M224	1B10312A	SIM Plate	1
25	M225	5M10036B	Handset Case	1
26	M226	1D10028A	Terminal	1
27	M227	1D10028A	Terminal	1
28	M228	XSB2.5 + 5FXK	Screw	1
29	M229	7G10087A	Label	1
30	M230	7G10087A	Label	1
31	M231	7K10004B	Tel. No. Card	1
32	M232	7C10053B	Name Plate	1
33	M233	XTB3 + 10GFXK	Screw	1
34	M234	5W10018B	Cap	1
35	M235	6Z10036A	Insulator	1
36	M236	1B10317A	Plate	1
37	M237	5Y10038A	Speaker Holder	1
38	M238	5X10018A	MIC Bushing	1
39	M239	6V10011A	Receiver Net	1
40	M240	7G10086A	Green Dot Tag	1
41	M241	6Z10062A	Receiver Sheet	1
42	M242	1B10636A	Receiver Plate	1
43	M243	6Z10065A	SIM Knob Sheet	1
44	DS731	DA10104B	Liquid Crystal Display	1
45	DS730	DA10105B	LCD Backlight	1
46	S702	EY10013B	Membrane Switch	1
47	S701	SP10206A	Key Pad	1
48		MCSA - 1142GB01	Handset Service Assembly	1
49	J750	EMM102M02	SIM Card Connector	1
50	LS701	HS10002B	Earpiece/Receiver	1
51	LS702	ST45W	Speaker	1
52	MK701	WM063T	Microphone	1
53	W701	A30062494	Curl Cord	1

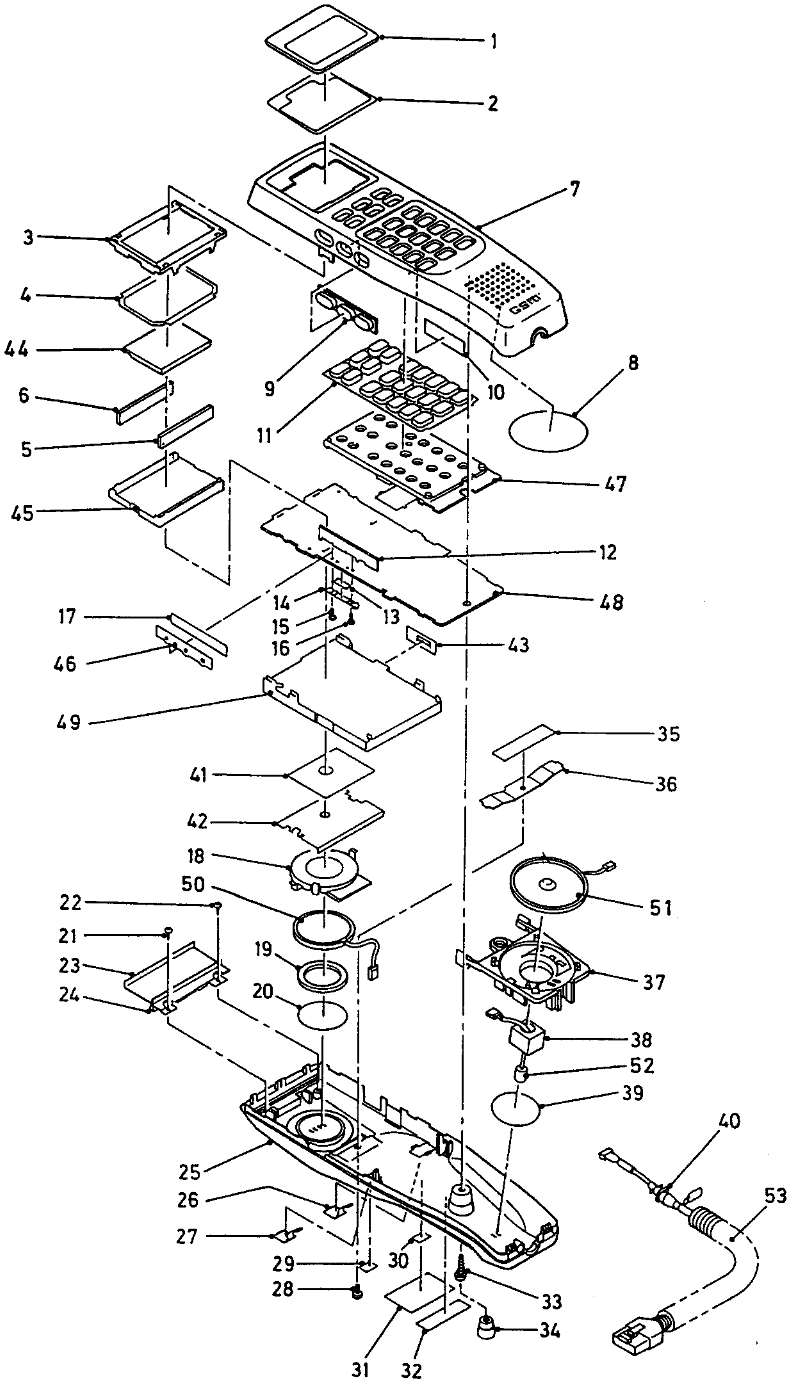
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Figure 11.2 Handset Unit (EB-1142) - Exploded View

11.5 HANDSFREE CRADLE UNIT (EB-J03467) - PARTS LIST

Refer to Figure 11.3 for exploded view of Handsfree Cradle Unit

Model No.	EB-J03467		Name	Handsfree Cradle
Item No.	Parts Symbol	Part No.	Part Name	Qty.
1	M301	5N10052B	Handsfree Cover	1
2	M302	XSB3 + 8FXK	Screw	1
3	M303	5U10006A	Cushion	1
4	M304	2G10010C	Terminal	1
5	M305	2G10010C	Terminal	1
6	M306	4N10016A	Spring A	1
7	M307	4N10016A	Spring A	1
8	M308	1B10320C	Terminal Ring	1
9	M309	1B10320C	Terminal Ring	1
10	M310	5Y10042B	Hook	1
11	M311	4N10017B	Spring B	1
12	M312	1B10313C	Hook Plate	1
13	M313	XTB3 + 8GFX	Screw	1
14	M314	XTB3 + 8GFX	Screw	1
15	M315	XTB3 + 8GFX	Screw	1
16	M316	XTB3 + 8GFX	Screw	1
17	M317	6Z10078A	Speaker Sheet	1
18	M318	6V10003A	Speaker Net	1
19	M319	1B10365A	Speaker Bracket	1
20	M320	1EA5094B	Radiator	1
21	M321	5R10020A	Volume Knob	1
22	M322	XSB3 + 6FX	Screw	1
23	M323	XSB3 + 6FX	Screw	1
24	M324	1BC5819A	Handsfree Plate	1
25	M325	5M10037B	Handsfree Case	1
26	M326	7C10055B	Name Plate	1
27	M327	XSB3 + 6FX	Screw	1
28	M328	7G10088A	Green Dot Label	1
29	LS801	VS45U0208	Speaker	1
30		MCSA3467GB01	Handsfree Service Assembly	1

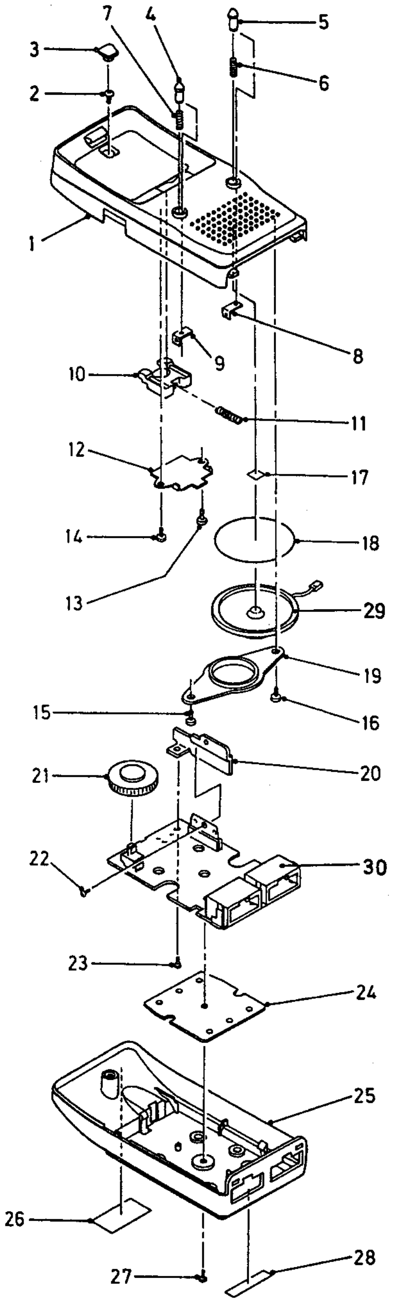
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Figure 11.3 Handsfree Cradle Unit (EB-J03467) - Exploded View

11.6 TRANSPORTABLE CASE UNIT (EB-J03468) - PARTS LIST

Refer to Figure 11.4 for exploded view of Transportable Case Unit

Model No.	EB-J03468		Name	Transportable
Item No.	Parts Symbol	Part No.	Part Name	Qty.
1	M440	5M10038C	Transportable Case	1
2	M441	5N10053A	Transportable Cover	1
3	M442	3A10038A	Transportable Screw	1
4	M443	4N10019A	Coil Spring	1
5	M444	2G10010C	Terminal	1
6	M445	2G10010C	Terminal	1
7	M446	4N10016A	Spring A	1
8	M447	4N10016A	Spring A	1
9	M448	5N10055A	Ornament	1
10	M449	6Z10063A	W-Face	1
11	M450	5E10070A	Cushion	1
12	M451	5BB5035B	Cushion	1
13	M452	5BB5035B	Cushion	1
14	M453	5BB5035B	Cushion	1
15	M454	5Y10042B	Hook	1
16	M455	4N10043A	Spring B	1
17	M456	1B10314B	Handle Bracket	1
18	M457	1A10202B	Antenna Fixing Plate	1
19	M458	XUC 2FX	E-Ring	1
20	M459	XUC 2FX	E-Ring	1
21	M460	3J10007C	Shoulder Pin	1
22	M461	3J10007C	Shoulder Pin	1
23	M462	5Z10021A	Handle	1
24	M463	1B10320C	Terminal Ring	1
25	M464	1B10323B	Terminal Ring	1
26	M465	1B10323A	Hook Plate	1
27	M466	XQN1.7 + C4FZ	Screw	1
28	M467	XQN1.7 + C4FZ	Screw	1
29	M468	5N10054B	Terminal Cover	1
30	M469	4Z10019A	Cover Spring	1
31	M470	5Y10044B	Battery Hook	1
32	M471	5Y10043B	Release Button	1
33	M472	4N10018A	Spring	1
34	M473	1B10322B	Button Plate	1
35	M474	1C10105B	Charger Shield Upper	1
36	M475	1D10023A	Terminal	1
37	M476	1D10023A	Terminal	1
38	M477	1D10023A	Terminal	1
39	M478	1D10023A	Terminal	1
40	M479	1D10023A	Terminal	1
41	M480	5Y10060A	Terminal Holder	1
42	M481	1C10106C	Charger Shield Lower	1
43	M482	1A10201D	Transportable Plate	1
44 to 58	M483 to M497	XTB3 + 8GFXK	Screw	1
59	E502	AN10030A	Antenna Assembly	1
60	W501	WC10325A	Cable	1
61		MCSA - 3468GB01	Charger Service Assembly	1

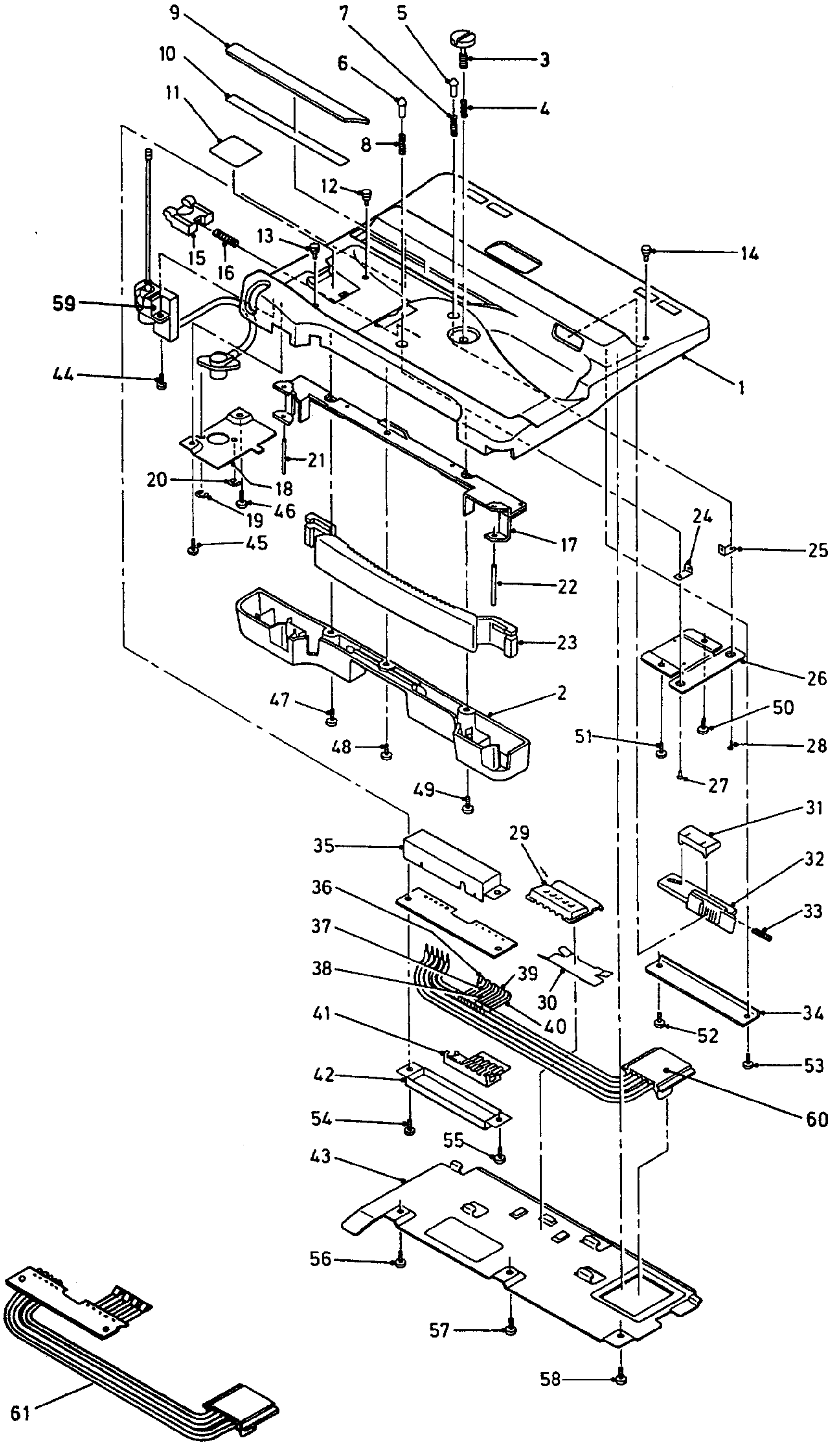
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Figure 11.4 Transportable Case Unit (EB-J03468) - Exploded View

11.7 TRANSCEIVER MOUNTING TRAY (EB-N01226) - PARTS LIST

Refer to Figure 11.5 for exploded view of Transceiver Mounting Tray

Model No.	EB-N01226		Name	Transceiver Mounting Tray
Item No.	Parts Symbol	Part No.	Part Name	Qty.
1	M601	1YZ5396A	Mounting	1
2	M602	3FE5007B	Guide Pin	1
3	M603	5Y10059B	Lever	1
4	M604	4PA5014AA	Spring	1
5	M605	4PA50014AB	Spring	1
6	M606	3GD5004A	Shaft	1
7	M607	1YZ5397A	Bracket	1
8	M608	XSB3 + 6FXK	Screw	1
9	M609	XSB3 + 6FXK	Screw	1
10	M610	5AF5105A	Plate	1
11	M611	7C10074B	Name Plate	1
12	M612	XYN3 + C6FX	Screw	1
13	M613	XTB5 + 16RFX	Screw	4
14	M614	XWG5BN	Washer	4
15	M615	XWG6FX	Washer	6

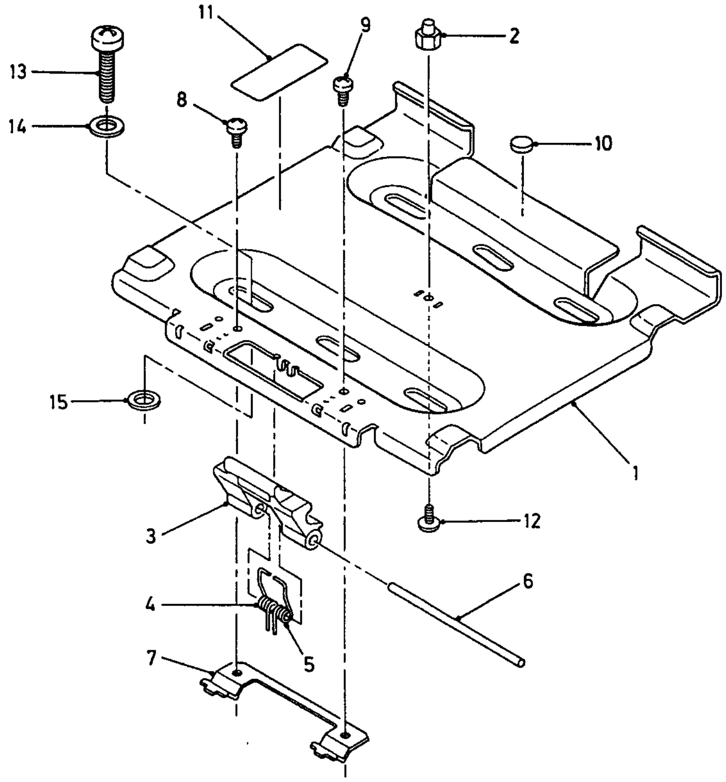
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Figure 11.5 Transceiver Mounting Tray (EB-N01226) - Exploded View

11.8 HANDSET UNIT - DETAILED PARTS LIST (CIRCUIT COMPONENTS)

Refer to Chapter 3 for pcb component layout diagrams

Model No.	EB-1142	Name	Handset	
Circuit Ref.	Part No.	Part Name	Description	Remarks
C701	YGM2B473K1ET	Capacitor	25 V 47 nF	
C702	YGM1C330J1HT	Capacitor	50 V 33 pF	
C703	YGM1C330J1HT	Capacitor	50 V 33 pF	
C704	YGM1C330J1HT	Capacitor	50 V 33 pF	
C705	YGM1C330J1HT	Capacitor	50 V 33 pF	
C706	YGM2B473K1ET	Capacitor	25 V 47 nF	
C707	YGM1C101J1HT	Capacitor	50 V 100 pF	
C708	ECST1AY225ZR	Capacitor	10 V 2.2 μF	
C709	YGM2B104K1ET	Capacitor	25 V 0.1 μF	
C710	ECST1CY105ZR	Capacitor	16 V 1 μF	
C711	YGM2B473K1ET	Capacitor	25 V 47 nF	
C712	YGM2B473K1ET	Capacitor	25 V 47 nF	
C713	YGM2B473K1ET	Capacitor	25 V 47 nF	
C714	ECST1CC106ZR	Capacitor	10 V 10 μF	
C715	ECST1CY105ZR	Capacitor	16 V 1 μF	
C716	YGM2B473K1ET	Capacitor	25 V 47 nF	
C717	ECST1CY1O5ZR	Capacitor	16 V 1 μF	
C718	ECST1CY105ZR	Capacitor	16 V 1 μF	
C719	YGM2B473K1ET	Capacitor	25 V 47 nF	
C720	YGM1C101J1HT	Capacitor	50 V 100 pF	
C721	ECST1CY105ZR	Capacitor	16 V 1 μF	
C722	ECST1CC106ZR	Capacitor	16 V 10 μF	
C723	YGM1C330J1HT	Capacitor	50 V 33 pF	
C724	YGM1C330J1HT	Capacitor	50 V 33 pF	
C725	YGM1C330J1HT	Capacitor	50 V 33 pF	
C726	YGM1C330J1HT	Capacitor	50 V 33 pF	
C727	YGM1C330J1HT	Capacitor	50 V 33 pF	
C728	YGM1C330J1HT	Capacitor	50 V 33 pF	
C729	ECST1CY105ZR	Capacitor	16 V 1 μF	
C730	ECST1YY224ZR	Capacitor	35 V 220 nF	
C731	YGM2B473K1ET	Capacitor	25 V 47 nF	
C732	YGM1C221J1HT	Capacitor	50 V 220 pF	
C733	YGM2B473K1ET	Capacitor	25 V 47 nF	
C734	YGM1C330J1HT	Capacitor	25 V 33 pF	
C735	YGM1B103K1HT	Capacitor	50 V 10 nF	
C736	YGM2B104K1ET	Capacitor	25 V 0.1 μF	
C737	ECST1CY105ZR	Capacitor	16 V 1 μF	
C738	ECST1CC106ZR	Capacitor	16 V 10 μF	
C739	ECST1VY224ZR	Capacitor	35 V 220 nF	
C740	ECST1CC106ZR	Capacitor	16 V 10 μF	
C741	YGM1C330J1HT	Capacitor	50 V 33 pF	
C742	YGM2B473K1ET	Capacitor	25 V 47 nF	
C743	ECEV1CA470P	Capacitor	16 V 47 μF	
C744	YGM2B473K1ET	Capacitor	25 V 47 nF	
C745	YGM2B473K1ET	Capacitor	25 V 47 nF	
C746	YGM2B473K1ET	Capacitor	25 V 47 nF	

Model No.	EB-1142		Name	Handset
Circuit Ref.	Part No.	Part Name	Description	Remarks
C747	YGM1B103K1HT	Capacitor	50 V 10 nF	
C748	YGM1B103K1HT	Capacitor	50 V 10 nF	
C749	YGM1B103L1HT	Capacitor	50 V 10 nF	
C750	YGM1B103K1HT	Capacitor	50 V 10 nF	
C751	YGM2B104K1ET	Capacitor	25 V 0.1 μF	
C752	YGM2B473K1ET	Capacitor	25 V 47 nF	
C753	YGM2B473K1ET	Capacitor	25 V 47 nF	
C754	YGM1B103K1HT	Capacitor	50 V 10 nF	
C755	YGM2B473K1ET	Capacitor	25 V 47 nF	
C756	YGM2B473K1ET	Capacitor	25 V 47 nF	
C757	YGM2B473K1ET	Capacitor	25 V 47 nF	
C758	YGM2B473K1ET	Capacitor	25 V 47 nF	
C761	YGM1C101J1HT	Capacitor	50 V 100 pF	
C762	YGM1C330J1HT	Capacitor	50 V 33 pF	
C763	YGM1C330J1HT	Capacitor	50 V 33 pF	
C764	YGM1B103K1HT	Capacitor	50 V 10 nF	
C765	YGM1C101J1HT	Capacitor	50 V 100 pF	
C766	YGM1C330J1HT	Capacitor	50 V 33 pF	
C767	YGM1C101J1HT	Capacitor	50 V 100 pF	
C768	ECST1CC106ZR	Capacitor	16 V 10 μF	
C769	ECST1VY224ZR	Capacitor	35 V 220 nF	
C771	YGM1C150J1HT	Capacitor	50 V 15 pF	
C772	YGM1C150J1HT	Capacitor	50 V 15 pF	
C773	YGM1C150J1HT	Capacitor	50 V 15 pF	
C774	YGM1C150J1HT	Capacitor	50 V 15 pF	
C784	ECST1AX106ZR	Capacitor	10 V 10 μF	
C786	ECST1AX106ZR	Capacitor	10 V 10 μF	
C787	ECST1AX106ZR	Capacitor	10 V 10 μF	
C790	YGM1C101J1HT	Capacitor	50 V 100 pF	
C791	YGM1C101J1HT	Capacitor	50 V 100 pF	
C792	YGM1C101J1HT	Capacitor	50 V 100 pF	
C793	YGM1C101J1HT	Capacitor	50 V 100 pF	
C7001	YGM1C101J1HT	Capacitor	50 V 100 pF	
C7002	YGM1C101J1HT	Capacitor	50 V 100 pF	
C7003	YGM1C101J1HT	Capacitor	50 V 100 pF	
C7004	YGM1C101J1HT	Capacitor	50 V 100 pF	
C7005	YGM1C101J1HT	Capacitor	50 V 100 pF	
C7006	YGM1C101J1HT	Capacitor	50 V 100 pF	
C7007	YGM1C101J1HT	Capacitor	50 V 100 pF	
C7008	YGM1C101J1HT	Capacitor	50 V 100 pF	
D701	MA8091LTX	Diode	9.7 V 150 mW	
D703	MA8091LTX	Diode	9.7 V 150 mW	
D709	YBAV99TRL	Diode	40 V 100 mA	
D710	YBAV99TRL	Diode	40 V 100 mA	
D713	YBZ84C6V2TRL	Diode	6.2 V 250 mA	
D715	YIMN10T108	Diode	-	
D716	YIMN10T108	Diode	-	
D718	YBAT18TRL	Diode	35 V 100 mA	

Model No.	EB-1142		Name	Handset
Circuit Ref.	Part No.	Part Name	Description	Remarks
D719	YBZ84C6V2TRL	Diode	6.2 V 250 mA	
D720	YBZ84C6V2TRL	Diode	6.2 V 250 mA	
D721	MA8062LTX	Diode	6.2 V 200 mA	
D722	MA8062LTX	Diode	6.2 V 200 mA	
D723	MA8100LTX	Diode	8.8 V 150 mW	
D724	YBZ84C6V2TRL	Diode	6.2 V 250 mA	
D725	YBZX84C16TRL	Diode	16 V 252 mA	
D726	YBZ84CV2TRL	Diode	6.2 V 250 mA	
D732	YBZ84C6V2TRL	Diode	6.2 V 250 mA	
D733	YBZ84C6V2TRL	Diode	6.2 V 250 mA	
D734	YBZ84C6V2TRL	Diode	6.2 V 250 mA	
D735	YBZ84C6V2TRL	Diode	6.2 V 250 mA	
D736	YBZ84C6V2TRL	Diode	6.2 V 250 mA	
D738	YBAT18TRL	Diode	35 V 100 mA	
D739	YBAT18TRL	Diode	35 V 100mA	
D740	YBZ84C6V2TRL	Diode	6.2 V 250mA	
DS730	DA10105B	Backlight	DUL 343	
DS731	DA10104B	LCD	Liquid Crystal Display	
E	EG10322E	PCB	HANDSET PCB.5	
J701	52043-1010	Connector	Z1F LOCK 10PIN	
J702	ILFPC12SS1L1	Connector	SOCKET	
J750	EMM102M02	Connector	SIM CARD CON	
J751	LSG1DG17-27	Connector	SOCKET	
J752	LSG1DG17-27	Connector	SOCKET	
LS701	HS10002B	Receiver	16 0.5 W	
LS702	ST45W	Speaker	16 0.5 W	
MK701	WM063T	Microphone	2.2k -64 dB	
P701	4D30249-3	Connector	ZIF LOCK 3 PIN	
P702	DF11-14DP2DS	Connector	14 PIN CONNECTOR	
P703	4D30249-2	Connector	A4-2PA-2DS(21)	
P704	ILZ2PS125L3E	Connector	1.25 PITCH 2 PIN	
Q701	2SD1767T100	Transistor	-	
Q702	YDTC144EK-TX	Transistor	40 V 200 mW	
Q703	YDTC144EK-TX	Transistor	40 V 200 mW	
Q705	2SD1767T100	Transistor	-	
Q706	2SC2412K-T96	Transistor	180 MHz 40 V 200 mW	
Q707	2SC2412K-T96	Transistor	180 MHz 40 V 200 mW	
Q708	YFMC2T99	Transistor	-	
Q709	YFMA4T99	Transistor	-	
Q710	YFMC2T99	Transistor	-	

Model No.	EB-1142		Name	Handset
Circuit Ref.	Part No.	Part Name	Description	Remarks
Q711	2SD1767T100	Transistor	-	
Q712	YFMC2T99	Transistor	-	
Q713	DTA144TK-TX	Transistor	-	
Q714	YDTA143EK-TX	Transistor	30 V 200 mW	
Q715	YFMC2T99	Transistor	-	
Q717	YDTC144EK-TX	Transistor	40 V 200 mW	
Q718	YDTD114EX-TX	Transistor	40 V 200 mW	
Q719	2SD1767T100	Transistor	-	
Q720	YFMC2T99	Transistor	-	
Q721	YDTD114EK-TX	Transistor	40 V 200 mW	
Q722	YDTA143EK-TX	Transistor	30 V 200 mW	
R701	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R702	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R703	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R704	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R705	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R706	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R707	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R708	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R709	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R710	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R711	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R713	ERJ3GEYJ330V	Resistor	62.5 mW 33	
R715	ERJ3GEYJ103V	Resistor	62.5 mW 10k	
R716	ERJ3GEYJ103V	Resistor	62.5 mW 10k	
R717	ERJ3GEYJ473V	Resistor	62.5 mW 47k	
R718	ERJ3GEYJ473V	Resistor	62.5 mW 47k	
R719	ERJ3GEYJ473V	Resistor	62.5 mW 47k	
R720	ERJ3GEYJ473V	Resistor	62.5 mW 47k	
R721	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R722	ERJ3GEYJ103V	Resistor	62.5 mW 10k	
R723	ERJ3GEYJ473V	Resistor	62.5 mW 47k	
R724	ERJ3GEYJ104V	Resistor	62.5 mW 100k	
R725	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R726	ERJ3GEYJ392V	Resistor	62.5 mW 3.9k	
R727	ERJ3GEYJ221V	Resistor	62.5 mW 220	
R728	ERJ3GEYJ103V	Resistor	62.5 mW 10k	
R729	ERJ3GEYJ151V	Resistor	62.5 mW 150	
R730	ERJ3GEYJ331V	Resistor	62.5 mW 330	
R731	ERJ3GEYJ331V	Resistor	62.5 mW 330	
R732	ERJ3GEYJ153V	Resistor	62.5 mW 15k	
R733	ERJ3GEYJ823V	Resistor	62.5 mW 82k	
R734	ERJ3GEYJ473V	Resistor	62.5 mW 47k	
R735	ERJ3GEYJ823V	Resistor	62.5 mW 82k	
R736	ERJ3GEYJ333V	Resistor	62.5 mW 33k	
R737	ERJ3GEYJ223V	Resistor	62.5 mW 22k	
R738	ERJ3GEYJ153V	Resistor	62.5 mW 15k	

Model No.	EB-1142		Name	Handset
Circuit Ref.	Part No.	Part Name	Description	Remarks
R739	ERJ3GEYJ473V	Resistor	62.5 mW 47k	
R740	ERJ3GEYJ823V	Resistor	62.5 mW 82k	
R741	ERJ3GEYJ683V	Resistor	62.5 mW 68k	
R742	ERJ3GEYJ331V	Resistor	62.5 mW 330	
R743	ERJ3GEYJ103V	Resistor	62.5 mW 10k	
R744	ERJ3GEYJ223V	Resistor	62.5 mW 22k	
R745	ERJ3GEYJ273V	Resistor	62.5 mW 27k	
R746	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R747	ERJ3GEYJ104V	Resistor	62.5 mW 100k	
R748	ERJ3GEYJ103V	Resistor	62.5 mW 10k	
R749	ERJ3GEYJ224V	Resistor	62.5 mW 220k	
R750	ERJ3GEYJ224V	Resistor	62.5 mW 220k	
R751	ERJ3GEYJ682V	Resistor	62.5 mW 6.8k	
R752	ERJ3GEYJ223V	Resistor	62.5 mW 22k	
R753	ERJ3GEYJ123V	Resistor	62.5 mW 12k	
R754	ERJ3GEYJ393V	Resistor	62.5 mW 39k	
R755	ERJ3GEYJ333V	Resistor	62.5 mW 33k	
R756	ERJ3GEYJ153V	Resistor	62.5 mW 15k	
R757	ERJ3GEYJ101V	Resistor	62.5 mW 100	
R758	ERJ3GEYJ331V	Resistor	62.5 mW 330	
R759	ERJ3GEYJ333V	Resistor	62.5 mW 33k	
R760	ERJ3GEYJ333V	Resistor	62.5 mW 33k	
R761	ERJ3GEYJ272V	Resistor	62.5 mW 2.7k	
R762	ERJ3GEYJ221V	Resistor	62.5 mW 220	
R763	ERJ3GEYJ222V	Resistor	62.5 mW 2.2k	
R764	ERJ3GEYJ100V	Resistor	62.5 mW 10	
R766	ERJ3GEYJ331V	Resistor	62.5 mW 330	
R767	ERJ3GEYJ152V	Resistor	62.5 mW 1.5k	
R768	ERJ3GEYJ330V	Resistor	62.5 mW 33	
R769	ERJ3GEYJ152V	Resistor	62.5 mW 1.5k	
R770	ERJ3GEYJ152V	Resistor	62.5 mW 1.5k	
R771	ERJ3GEYJ152V	Resistor	62.5 mW 1.5k	
R772	ERJ3GEYJ152V	Resistor	62.5 mW 1.5k	
R773	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R774	ERJ3GEYJ152V	Resistor	62.5 mW 1.5k	
R775	ERJ3GEYJ104V	Resistor	62.5 mW 100k	
R776	ERJ3GEY0R00V	Resistor	62.5 mW 0	
R777	ERJ3GEYJ221V	Resistor	62.5 mW 220	
R778	ERJ3GEYJ221V	Resistor	62.5 mW 220	
R779	ERJ3GEYJ101V	Resistor	62.5 mW 100	
R780	ERJ3GEY0R00V	Resistor	62.5 mW 0	
R781	ERJ3GEYJ330V	Resistor	62.5 mW 33	
R782	ERJ3GEYJ330V	Resistor	62.5 mW 33	
R783	ERJ3GEYJ331V	Resistor	62.5 mW 330	
R784	ERJ3GEYJ104V	Resistor	62.5 mW 100k	
R785	ERJ3GEYJ331V	Resistor	62.5 mW 330	
R786	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R787	ERJ3GEYJ331V	Resistor	62.5 mW 330	

Model No.	EB-1142		Name	Handset
Circuit Ref.	Part No.	Part Name	Description	Remarks
R788	ERJ3GEYJ331V	Resistor	62.5 mW 330	
R789	ERJ3GEYJ103V	Resistor	62.5 mW 10k	
R790	ERJ3GEYJ104V	Resistor	62.5 mW 100k	
R791	ERJ3GEYJ103V	Resistor	62.5 mW 10k	
R792	ERJ3GEYJ223V	Resistor	62.5 mW 22k	
R793	ERJ3GEYJ151V	Resistor	62.5 mW 150	
R794	ERJ3GEYJ105V	Resistor	62.5 mW 1M	
R795	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R796	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R798	ERJ3GEYJ473V	Resistor	62.5 mW 47k	
R7001	ERJ3GEYJ221V	Resistor	62.5 mW 220	
R7002	ERJ3GEYJ221V	Resistor	62.5 mW 220	
R7003	ERJ3GEYJ221V	Resistor	62.5 mW 220	
R7004	ERJ3GEYJ221V	Resistor	62.5 mW 220	
R7005	ERJ3GEYJ221V	Resistor	62.5 mW 220	
R7006	ERJ3GEYJ221V	Resistor	62.5 mW 220	
R7007	ERJ3GEY0R00V	Resistor	62.5 mW 0	
R7008	ERJ3GEY0R00V	Resistor	62.5 mW 0	
R7009	ERJ3GEY0R00V	Resistor	62.5 mW 0	
R7010	ERJ3GEY0R00V	Resistor	62.5 mW 0	
R7011	ERJ3GEYJ473V	Resistor	62.5 mW 47k	
R7012	ERJ3GEYJ103V	Resistor	62.5 mW 10k	
R7013	ERJ3GEYJ103V	Resistor	62.5 mW 10k	
R7014	ERJ3GEYJ152V	Resistor	62.5 mW 1.5k	
R7015	ERJ3GEYJ104V	Resistor	62.5 mW 100k	
R7017	ERJ3GEYJ103V	Resistor	62.5 mW 10k	
R7018	ERJ3GEY0R00V	Resistor	62.5 mW 0	
R7020	ERJ3GEYJ10V	Resistor	62.5 mW 1k	
RT701	Y15730353001		30k	
S701	SP10206B	Keypad		
S702	EY10013B	Switch		
U701	UC10013A	I.C.	CPU	
U702	YS8054ALB-LM	I.C.	V-DET	
U703	YTLC272PS	I.C.	-	
U706	YLM386N1	I.C.	OP AMP	
U707	YHEF4066BT	I.C.	-	
U708	YTLC272PS	I.C.	-	
U709	YULPP0005	I.C.	-	
U710	YMSM5259GSVK	I.C.	-	
U711	YMSM5259GSVK	I.C.	-	
U712	YPC74HC14T	I.C.	-	
U713	YTA78L05F	I.C.	REG 5 V	
U714	YPC74HC242T	I.C.	-	
U715	YPC74HC08T	I.C.	-	
U716	YPC74HC74T	I.C.	-	

Model No.	EB-1142		Name	Handset
Circuit Ref.	Part No.	Part Name	Description	Remarks
U717	YULTA0020	I.C.	-	
U718	YULTA0020	I.C.	-	
U719	YULTA0020	I.C.	-	
U720	YULTA0021	I.C.	-	
U721	YULTA0021	I.C.	-	
U722	YUMTA0001	I.C.	-	
U723	YPC74HC02T	I.C.	-	
W701	WC10118C	Curl Cord	A30062494	
W710	WC10251B	Connector	A40079527	
W730	WC10250B	Connector	A40079525	
Y701	FX00011A	Crystal	3.84 MHz HC-49-3.84M	
Y702	FX00021A	Crystal	7.1424 MHz FC-49-7.1424	

11.9 HANDSFREE CRADLE UNIT - DETAILED PARTS LIST (CIRCUIT COMPONENTS)

Refer to Chapter 3 for pcb component layout diagrams

Model No.	EB-J03467	Name	Handsfree	
Circuit Ref.	Part No.	Part Name	Description	Remarks
C801	ECST1CY105ZR	Capacitor	16 V 1 µF	
C802	YGM1B102K1HT	Capacitor	50 V 1 nF	
C803	ECEV1HAS010R	Capacitor	50 V 1 µF	
C804	ECST1CY105ZR	Capacitor	16 V 1 µF	
C805	YGM1B471K1HT	Capacitor	50 V 470 pF	
C806	YGM1B102K1HT	Capacitor	50 V 1 nF	
C807	ECST1CY105ZR	Capacitor	16 V 1 µF	
C808	YGM1B102K1HT	Capacitor	50 V 1 nF	
C809	ECEV1EA100P	Capacitor	25 V 10 µF	
C810	ECEA1EU101	Capacitor	25 V 100 µF	
C811	YGM1B102K1HT	Capacitor	50 V 1 nF	
C812	YGM2B473K1ET	Capacitor	25 V 47 nF	
C813	ECEV1CA330P	Capacitor	16 V 33 µF	
C815	ECEA1CU221	Capacitor	16 V 220 µF	
C816	YGM2B473K1ET	Capacitor	25 V 47 nF	
C817	ECST1CY105ZR	Capacitor	16 V 1 µF	
C818	ECEV1CA470P	Capacitor	16 V 47 µF	
C819	YGM2B473K1ET	Capacitor	25 V 47 nF	
C820	YGM2B223K1HT	Capacitor	50 V 22 nF	
C821	YGM1B102K1HT	Capacitor	50 V 1 nF	
C822	YGM1B102K1HT	Capacitor	50 V 1 nF	
C823	YGM2B473K1ET	Capacitor	25 V 47 nF	
C824	YGM2B473K1ET	Capacitor	25 V 47 nF	
C825	ECEV1CA470P	Capacitor	16 V 47 µF	
C826	ECEV1CA470P	Capacitor	16 V 47 µF	
C827	ECEV1CA330P	Capacitor	16 V 33 µF	
C828	ECEA1EU101	Capacitor	25 V 100 µF	
C829	YGM1B331K1HT	Capacitor	50 V 330 pF	
C830	ECST1CY105ZR	Capacitor	16 V 1 µF	
C831	YGM1B471K1HT	Capacitor	50 V 470 pF	
C832	YGM2B473K1ET	Capacitor	25 V 47 nF	
C833	ECEV1EA100P	Capacitor	25 V 10 µF	
C834	YGM2B473K1ET	Capacitor	25 V 47 nF	
C835	YGM2B473K1ET	Capacitor	25 V 47 nF	
C836		Capacitor	100 pF	
C890	YGM2B473K1ET	Capacitor	25 V 47 nF	
D801	YBZX84C6V2	Diode		
D802	YBAV99TRL	Diode	40 V 100 mA	
D803	YBZX84C5V1	Diode	5.1 V	
D804	YBZX84C6V2	Diode		
D805	YBZX84C8V2	Diode	8.2 V	
D806	YBZX84C6V2	Diode		
D808	YBZX84C6V2	Diode		

Model No.	EB-J03467		Name	Handsfree
Circuit Ref.	Part No.	Part Name	Description	Remarks
E	EG10323D	PCB	H-F-CR-GSM	
J801	NT10-16SAG	Connector		
J802	EJU3XL1	Connector	1 PIN	
J803	JA10002A	Connector	SPEAKER CABLE	
J804	NT10-16SAG	Connector		
LS801	VS45U0208	Loud Speaker	1.5W 4 SPEAKER	
P802	175487-2	Connector	175487-2	
Q803	YDTC124TK-TX	Transistor	UN2217-TX	
Q806	2SB710RS-TX	Transistor	25 V 200 mW	
Q807	2SD602RS-TX	Transistor	25 V 200 mW	
Q808	2SD602RS-TX	Transistor	25 V 200 mW	
Q811	YDTC114EK-TX	Transistor	10 V 100 mF	
Q812	2SB934	Transistor	80 V 40W	
R801	ERJ3GEYJ561V	Resistor	62.5 mW 560	
R802	ERJ3GEYJ473V	Resistor	62.5 mW 47k	
R803	ERJ3GEYJ104V	Resistor	62.5 mW 100k	
R804	ERJ3GEYJ103V	Resistor	62.5 mW 10k	
R805	ERJ3GEYJ473V	Resistor	62.5 mW 47k	
R807	EVM7LSX00B15	Resistor	50 mW 100k	
R808	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R809	ERJ3GEYJ222V	Resistor	62.5 mW 2.2k	
R810	ERJ3GEYJ472V	Resistor	62.5 mW 4.7k	
R811	ERJ3GEYJ473V	Resistor	62.5 mW 47k	
R812	ERJ3GEYJ153V	Resistor	62.5 mW 15k	
R813	ERJ3GEYJ333V	Resistor	62.5 mW 33k	
R814	ERJ3GEYJ104V	Resistor	62.5 mW 100k	
R815	ERJ3GEYJ103V	Resistor	62.5 mW 10k	
R816	ERJ3GEYJ222V	Resistor	62.5 mW 2.2k	
R817	ERJ3GEYJ221V	Resistor	62.5 mW 220	
R818	ERJ3GEYJ2R2V	Resistor	62.5 mW 2.2	
R819	ERJEGEYJ152V	Resistor	62.5 mW 1.5k	
R820	ERJ3GEYJ472V	Resistor	62.5 mW 4.7k	
R821	EVM7LSX00B24	Resistor	50 mW 20k	
R822	ERJ3GEYJ823V	Resistor	62.5 mW 82k	
R823	ERJ3GEYJ471V	Resistor	62.5 mW 470	
R824	ERJ3GEYJ224V	Resistor	62.5 mW 220k	
R825	EVM7LSX00B53	Resistor	50 mW 5k	
R826	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R827	ERJ3GEYJ101V	Resistor	62.5 mW 100	
R828	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R829	ERJ3GEYJ331V	Resistor	62.5 mW 330	
R830	ERJ3GEYJ220V	Resistor	62.5 mW 22	

Model No.	EB-J03467	Name	Handsfree	
Circuit Ref.	Part No.	Part Name	Description	Remarks
R831	ERJ3GEYJ822V	Resistor	62.5 mW 8.2 k	
R832	ERJ3GEYJ332V	Resistor	62.5 mW 3.3k	
R833	ERJ3GEYJ222V	Resistor	62.5 mW 2.2k	
R834	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R835	ERJEGEYJ222V	Resistor	62.5 mW 2.2k	
R836	ERJ3GEY0R00V	Resistor	62.5 mW 0	
R837	ERJ3GEYJ220V	Resistor	62.5 mW 22	
R838	ERJ3GEYJ822V	Resistor	62.5 mW 8.2k	
R839	ERJ3GEYJ322V	Resistor	62.5 mW 3.3k	
R840	ERJ3GEYJ103V	Resistor	62.5 mW 10k	
R841	ERJ3GEYJ103V	Resistor	62.5 mW 10k	
R842	EVUF2AF15C54	Resistor	500 mW 50k	
R844	ERJ3GEYJ223V	Resistor	62.5 mW 22k	
R845	ERJ3GEYJ105V	Resistor	62.5 mW 1M	
R846	ERJ3GEYJ104V	Resistor	62.5 mW 100k	
R847	ERJ3GEYJ472V	Resistor	62.5 mW 4.7k	
R848	ERJ6GEYJ472V	Resistor	100 mW 4.7k	
R849	ERJ6GEYJ472V	Resistor	100 mW 4.7k	
R850	ERJ6GEYJ472V	Resistor	100 mW 4.7k	
R851	ERJ3GEYJ153V	Resistor	62.5 mW 15k	
R852	ERJ3GEYJ222V	Resistor	62.5 mW 2.2k	
R854	ERJ3GEYJ473V	Resistor	62.5 mW 47k	
R855	ERJ3GEYJ103V	Resistor	62.5 mW 10k	
R856	ERJ3GEYJ104V	Resistor	62.5 mW 100k	
R857	ERJ3GEYJ104V	Resistor	62.5 mW 100k	
R858	ERJ3GEYJ103V	Resistor	62.5 mW 10k	
R859	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R860	ERJ3GEYJ393V	Resistor	62.5 mW 39k	
R861	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R862	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
U801	YNJM3404AM	I.C.	OP AMP DUAL	
U802	YNJM3404AM	I.C.	OP AMP DUAL	
U803	YULTA0008	I.C.	TC4S66FTE85L	
U804	YNJM3404AM	I.C.	OP AMP DUAL	
U805	AN7140	I.C.		
U806	YUPC393G	I.C.	COMPARATOR	
U807	YNJM555M	I.C.	TIMER	
U808	YTA78L05F	I.C.		
U809	YTA78L08F	I.C.		
U810	YNJM3404AM	I.C.	OP AMP DUAL	
U811	YTA78L05F	I.C.		
U812	YULTA0008	I.C.	TC4S66FTE85L	
U813	YULTA0008	I.C.	TC4S66FTE85L	
U814	YULTA0008	I.C.	TC4S66FTE85L	
U815	YL4940V10	I.C.		
W802	WC10824A	Cable	-	

11.10 TRANSPORTABLE CASE UNIT - DETAILED PARTS LIST (CIRCUIT COMPONENTS)

Refer to Chapter 3 for pcb component layout diagrams

Model No.	EB-J03468		Name	Transportable
Circuit Ref.	Part No.	Part Name	Description	Remarks
C501	YGM2B683K1ET	Capacitor	25 V 68 nF	
C502	YGM1F473Z1CT	Capacitor	16 V 47 nF	
C505	YGM1B102K1HT	Capacitor	50 V 1 nF	
C506	YGM1B223K1ET	Capacitor	25 V 22 μF	
C507	ECA1VXS220	Capacitor	35 V 22 μF	
C508	ECA1VXS220	Capacitor	25 V 22 μF	
C509	ECA1VXS220	Capacitor	25 V 22 μF	
C510	YGM1B102K1HT	Capacitor	50 V 1 nF	
C511	ECEA1EKS100	Capacitor	25 V 10 μF	
C512	ECEA1EKS100	Capacitor	25 V 10 μF	
C513	ECEA1EKS100	Capacitor	25 V 10 μF	
C514	YGM1B103K1HT	Capacitor	50 V 10 nF	
C515	YGM1B223K1ET	Capacitor	25 V 22 μF	
C516	YGM1B103K1HT	Capacitor	50 V 10 nF	
C517	YGM1C101J1HT	Capacitor	50 V 100 pF	
C518	YGM1B103K1HT	Capacitor	50 V 10 nF	
C519	YGM1C101J1HT	Capacitor	50 V 100 pF	
C521	ECEV1EV4R7SR	Capacitor	25 V 4.7 μF	
C523	YGM1B103K1HT	Capacitor	50 V 10 nF	
D501	YD1FS4-4063	Diode	40 V 1.2A	
D502	YDAN202UT106	Diode	80 V 100 mA	
D503	MA8180MTX	Diode	18 V	
D504	MA8180MTX	Diode	18 V	
D505	YDA114T106	Diode	80 V 100 mA	
D506	YD1FL20U4063	Diode	200 V 1.1A	
D507	YDA114T106	Diode	80 V 100 mA	
D509	MA153TX	Diode	40 V 100 mA	
D510	YDA114T106	Diode	80 V 100 mA	
E	EG10570F	PCB	-	
E502	AN10030A		Antenna Tx:890-915 MHz Rx:935-960 MHz	
Q501	YFMW5T99	Transistor	40 V 300 mA	
Q502	YFMW5T99	Transistor	40 V 300 mA	
Q503	YDTA114EU-TX	Transistor	50 V 300 mW	
Q504	YFMY1T99	Transistor	40 V 300 mW	
Q505	2SK612Z	Transistor		
R501	ERJ3GEYJ224V	Resistor	62.5 mW 220k	
R502	ERJ3GEYJ223V	Resistor	62.5 mW 22k	
R503	ERJ3GEYJ682V	Resistor	62.5 mW 6.8k	
R504	ERJ3GEYJ103V	Resistor	62.5 mW 10k	

Model No.	EB-J03468	Name	Transportable	
Circuit Ref.	**Part No.**	**Part Name**	**Description**	**Remarks**
R505	ERJ3GEYJ103V	Resistor	62.5 mW 10k	
R506	ERJ3GEYJ103V	Resistor	62.5 mW 10k	
R507	ERJ3GEYJ184V	Resistor	62.5 mW 180k	
R508	ERJ3GEYJ154V	Resistor	62.5 mW 150k	
R509	ERJ3GEYJ333V	Resistor	62.5 mW 33k	
R511	ERJ3GEYJ153V	Resistor	62.5 mW 15k	
R512	ERJ3GEYJ274V	Resistor	62.5 mW 270k	
R513	ERJ3GEYJ682V	Resistor	62.5 mW 6.8k	
R514	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R515	ERJ3GEYJ102V	Resistor	62.5 mW 1k	
R516	ERJ3GEYJ101V	Resistor	62.5 mW 100	
R517	ERJ14YK4R7H	Resistor	250 mW 4.7	
R518	ERJ14YK4R7H	Resistor	250 mW 4.7	
R519	ERJ3GEYJ103V	Resistor	62.5 mW 10k	
R520	ERJ14YK1R0H	Resistor	250 mW 1	
R521	ERJ14YJ102H	Resistor	250 mW 1k	
R522	ERJ3GEYJ564V	Resistor	62.5 mW 560k	
R523	ERJ3GEYJ105V	Resistor	62.5 mW 1M	
R524	ERJ3GEYJ103V	Resistor	62.5 mW 10k	
R525	ERJ3GEYJ334V	Resistor	62.5 mW 330k	
R526	ERJ3GEYJ103V	Resistor	62.5 mW 10k	
RT501	Y15730353001	Thermistor	400 mW 30k	
T501	TL10008A	Transformer	CEI-128	
U501	YNJM78L05UA	I.C.		
U502	YPC74HC4060T	I.C.		
U503	YUPC494GS-E2	I.C.		
W501	WC10325B	TP Jack	-	
W502	WC10824A	Cable	-	

12. GLOSSARY OF TERMS

Throughout the Service Manual, references are made to certain items using terms or abbreviations. The following list details those most frequenctly used, as well a a few additions that are associated with basic GSM principles.

AF	Audio Frequency
AGC	Automatic Gain Control
ANA	Mixed Analogue/Digital Chip
ASIC	Application Specific Integrated Circuit
BCCH	Broadcast Control Channel
BER	Bit Error Rate
BS	Base Station
BSC	Base Station Controller
BSIC	Base Station Identification Code
CCITT	International Telegraph and Telephone Consultative Committee
CIE	Coding, Interleaving and Encryption chip
CIO	Custom Input, Output chip
DAI	Digital Audio Interface
DRX	Discontinuous Reception
DSP	Digital Signal Processing
DTMF	Dual Tone Multiple Frequency
DTX	Discontinuous Transmission
ERP	Effective Radiated Power
FCCh	Frequency Correction Channel
GSM	Global System for Mobile Communications
IMEI	International Mobile Station Equipment Identity
kbits/s	Kilobits per second
LCD	Liquid Crystal Display
LNA	Low Noise Amplifier
LPF	Low Pass Filter
LSB	Least Significant Bit
MMI	Man Machine Interface
MS	Mobile Station
MSB	Most Significant Bit
MTBF	Mean Time Between Failure
NVM	Non Volatile Memory
PA	Power Amplifier
PCM	Pulse Code Modulation
PLMN	Public Land Mobile Network
PSTN	Public Switched Telephone Network
RF	Radio Frequency
RSSI	Receiver Signal Strength Indication
Rx	Receiver

SACCh	Slow Associated Control Channel
SAW	Surface Acoustic Wave
SB	Synchronisation Burst
SIM	Subscriber Indentification Module
T/A	Type Approval
TCH	Traffic Channel
TDMA	Time Division Multiple Access
TS	Time Slot
Tx	Transmit
VCO	Voltage Controlled Oscillator
VCXO	Voltage Controlled Crystal Oscillator
VSWR	Voltage Standing Wave Ratio

APPENDIX A

GSM PHILOSOPHY

A.1 GSM CONCEPT

Global System for Mobile Communication (GSM) is a committee set up to specify a new mobile telephone standard that would provide pan-European compatibility, as well as introduce new techniques to enable greater capacity and call reliability over existing analogue systems.

To achieve these improvements the GSM committee decided to use a digital system of transmission, rather than analogue. The digital system specified the use of Gaussian Minimum Shift Keying (GMSK), to modulate the carrier, with time division multiple access (TDMA) used to provide 8 speech/data links per channel. Complex encryption/security algorithms and enhanced mobile/base station communication combine to make GSM a much more secure, reliable network. For a mobile telephone to operate on such a system, many special devices called ASICs (Application Specific Integrated Circuit) have been designed specifically for GSM applications. The ASICs combine several processes into one IC, thereby keeping size to a minimum.

A.2 SYSTEM GROWTH

One of the main specifications for GSM was pan-European compatibility. System Operators throughout Europe are implementing GSM in parallel to their analogue systems. As GSM matures, the operator's of each country will expand their networks in terms of coverage and features, thereby fulfilling their commitment to GSM. Initially, countries will be at different stages and consequently full 'roaming' between countries will not be available.

As time progresses analogue systems will be superseded by GSM, as depicted in Figure A.1, below, which provides a projected view of subscriber volumes/elapsed time.

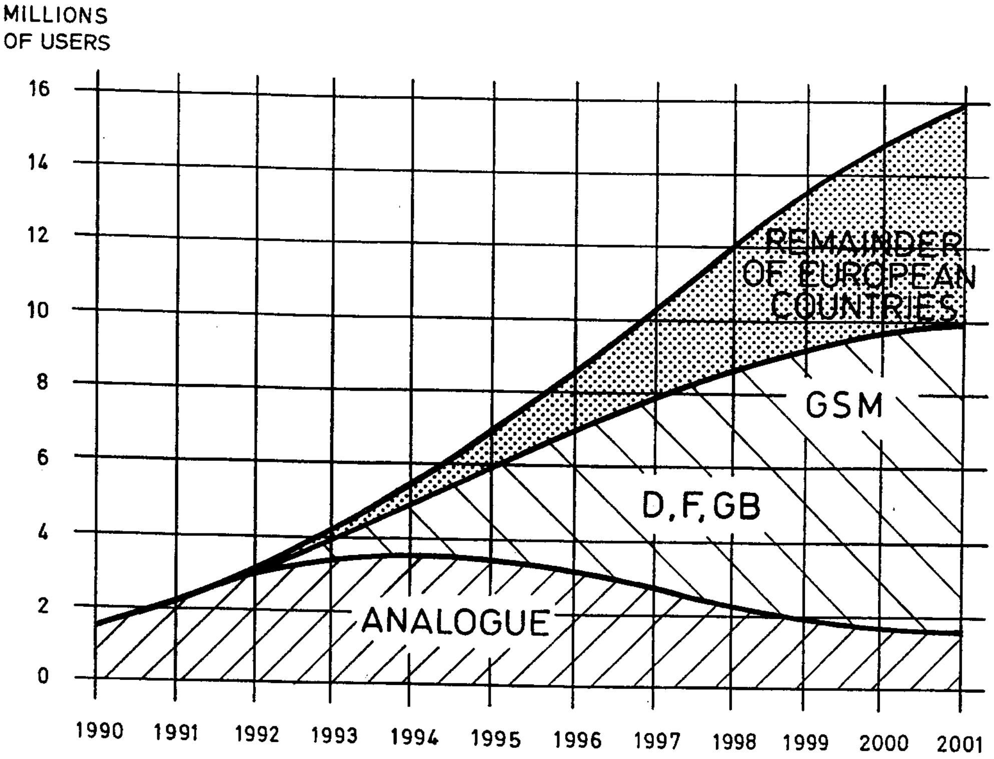

Figure A.1 Forecast Growth of Cellular Networks in Europe

APPENDIX B

PACKAGING

The GSM Mobile telephone is supplied as three basic kit forms:

(1) Main Kit EB-KJ0151, comprising:

- (a) Transceiver Unit EB-2803.
- (b) Handset Unit EB-1142.
- (c) Operating Instructions EBZ-03927AA.

(2) Car Mount Kit EB-KJ0149, comprising:

- (a) Mounting Bracket EB-N01226 (plus fixing kit).
- (b) Handsfree Cradle Unit EB-J03467.
- (c) Adjustable Angle Bracket EB-N0001 (plus fixing kit).
- (d) Microphone Kit EB-M0108.
- (e) Interconnecting Lead (5 m) EB-W01616.
- (f) Power Supply Lead (5 m) EB-W0129.

(3) Transportable Case Kit EB-KJ0150, comprising:

- (a) Transportable Case Unit EB-J03468.
- (b) Battery Pack (1.2 AH) EB-P02740.
- (c) Carrying Strap EB-B0169.
- (d) AC-DC Converter EB-P02741 (UK), EB-P10125 (EU).
- (e) Cigarette Lighter Cable EB-W0071.

Each kit, and its associated packaging are shown in Figures B.1 to B.3.

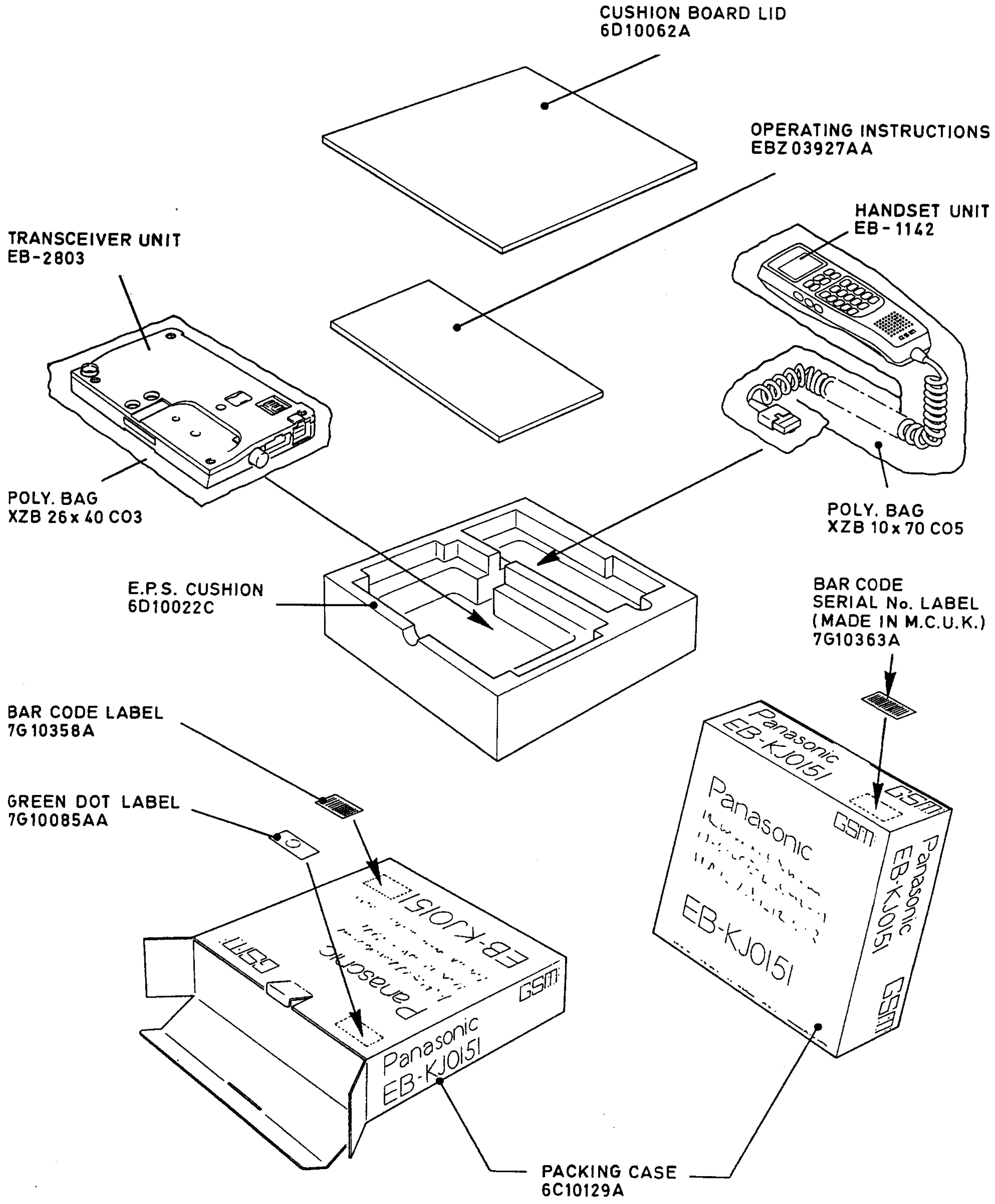
CUSHION BOARD LID
6D10062A
OPERATING INSTRUCTIONS
EBZ03927AA
HANDSET UNIT
EB-1142
TRANSCEIVER UNIT
EB-2803
POLY. BAG
XZB 26 x 40 C03
POLY. BAG
XZB 10 x 70 C05
E.P.S. CUSHION
6D10022C
BAR CODE
SERIAL No. LABEL
(MADE IN M.C.U.K.)
7G10363A
BAR CODE LABEL
7G10358A
GREEN DOT LABEL
7G10085AA
Panasonic
EB-KJ0151
GSM
PACKING CASE
6C10129A

Figure B.1 Main Kit (EB-KJ0151) - Packaging

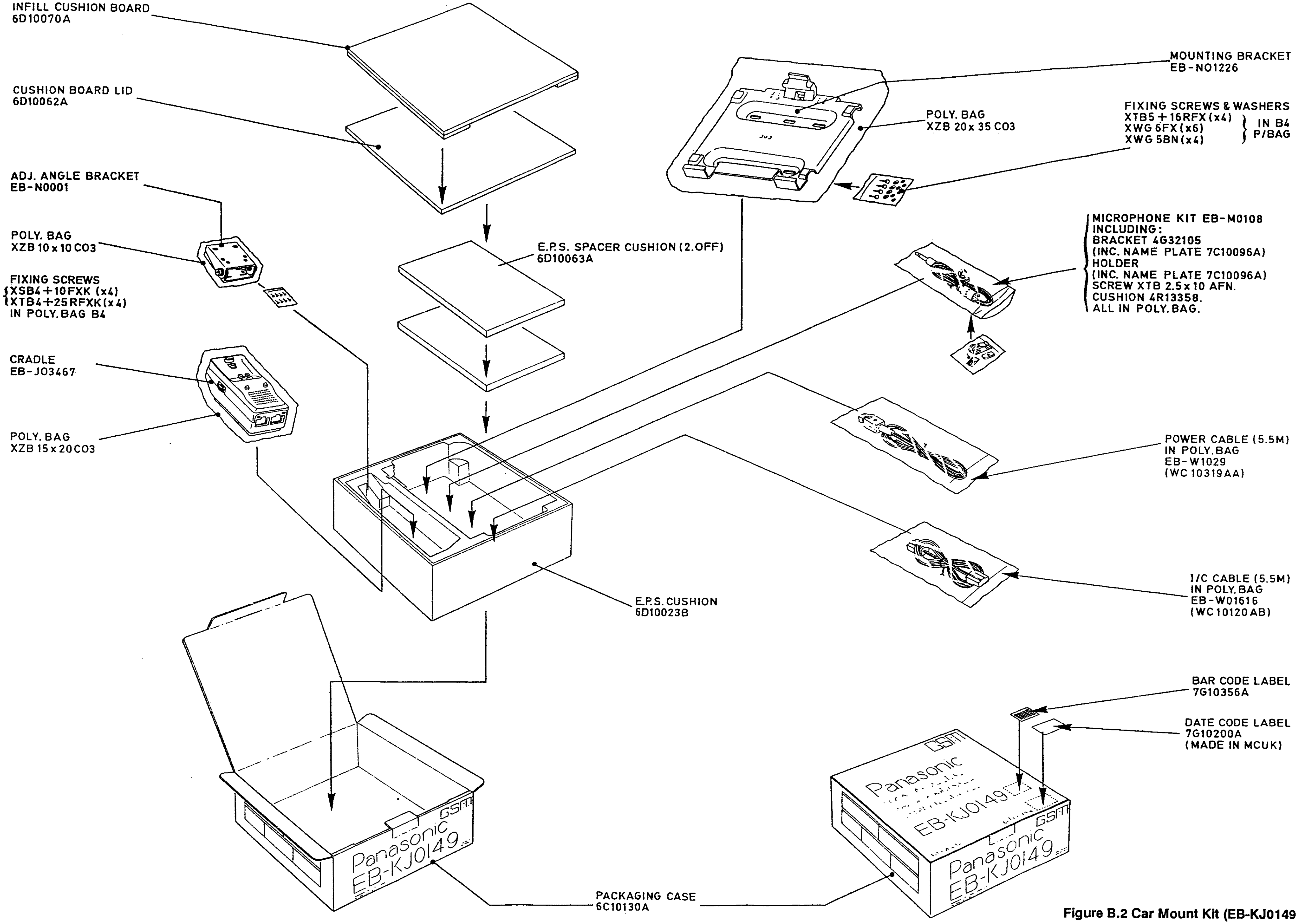
INFILL CUSHION BOARD
6D10070A
CUSHION BOARD LID
6D10062A
ADJ. ANGLE BRACKET
EB-N0001
POLY. BAG
XZB 10 x 10 CO3
FIXING SCREWS
{XSB4+10FXK (x4)
{XTB4+25RFXK (x4)
IN POLY. BAG B4
CRADLE
EB-J03467
POLY. BAG
XZB 15 x 20CO3
E.P.S. SPACER CUSHION (2.OFF)
6D10063A
E.P.S. CUSHION
6D10023B
PACKAGING CASE
6C10130A
MOUNTING BRACKET
EB-NO1226
POLY. BAG
XZB 20 x 35 CO3
FIXING SCREWS & WASHERS
XTB5 + 16RFX (x4)
XWG 6FX (x6)
XWG 5BN (x4)
IN B4 P/BAG
MICROPHONE KIT EB-M0108
INCLUDING:
BRACKET 4G32105
(INC. NAME PLATE 7C10096A)
HOLDER
(INC. NAME PLATE 7C10096A)
SCREW XTB 2.5 x 10 AFN.
CUSHION 4R13358.
ALL IN POLY. BAG.
POWER CABLE (5.5M)
IN POLY. BAG
EB-W1029
(WC 10319AA)
I/C CABLE (5.5M)
IN POLY. BAG
EB-W01616
(WC 10120AB)
BAR CODE LABEL
7G10356A
DATE CODE LABEL
7G10200A
(MADE IN MCUK)
GSM
Panasonic
EB-KJ0149

Figure B.2 Car Mount Kit (EB-KJ0149) - Packaging

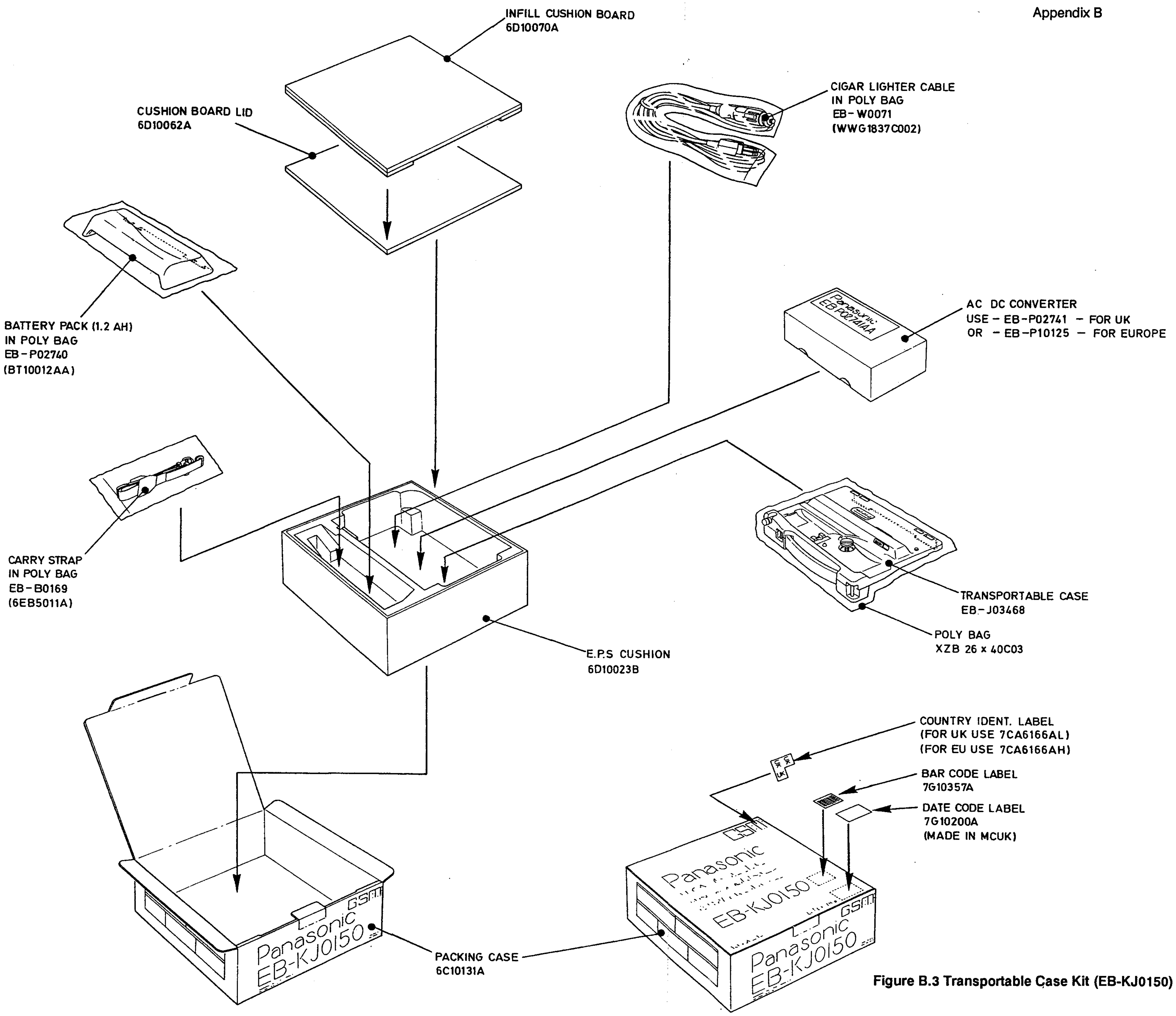
INFILL CUSHION BOARD
6D10070A
CUSHION BOARD LID
6D10062A
CIGAR LIGHTER CABLE
IN POLY BAG
EB-W0071
(WWG1837C002)
BATTERY PACK (1.2 AH)
IN POLY BAG
EB-P02740
(BT10012AA)
AC DC CONVERTER
USE - EB-P02741 - FOR UK
OR - EB-P10125 - FOR EUROPE
Panasonic
EB-P02741AA
CARRY STRAP
IN POLY BAG
EB-B0169
(6EB5011A)
TRANSPORTABLE CASE
EB-J03468
POLY BAG
XZB 26 x 40C03
E.P.S CUSHION
6D10023B
COUNTRY IDENT. LABEL
(FOR UK USE 7CA6166AL)
(FOR EU USE 7CA6166AH)
UK
UK
UK
BAR CODE LABEL
7G10357A
DATE CODE LABEL
7G10200A
(MADE IN MCUK)
GSM
Panasonic
EB-KJ0150
PACKING CASE
6C10131A

Figure B.3 Transportable Case Kit (EB-KJ0150) - Packaging